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THE CHRONICLES
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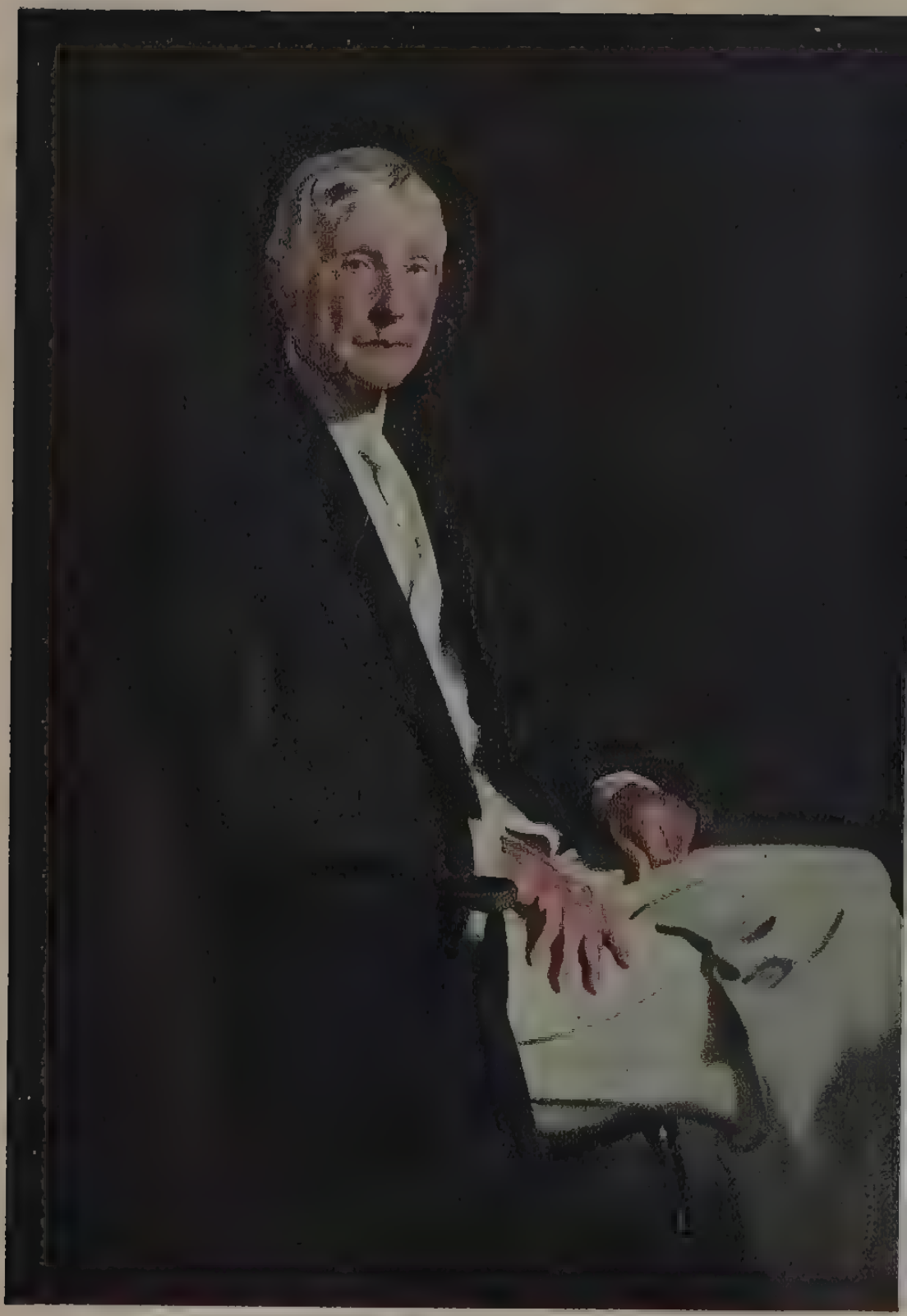

JOHN D. ROCKEFELLER

After the painting by John S. Sargent

THE AGE OF BIG BUSINESS

A CHRONICLE OF THE CAPTAINS OF INDUSTRY

BY BURTON J. HENDRICK

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ILLUSTRATION

HN D. ROCKEFELLER
After the painting by John S. Sargent. *Frontispiece*

THE AGE OF BIG BUSINESS

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CHAPTER I

DUSTRIAL AMERICA AT THE END OF THE CIVIL WAR

COMPREHENSIVE survey of the United States, at end of the Civil War, would reveal a state of iety which bears little resemblance to that of ay. Almost all those commonplace fundamen- s of existence, the things that contribute to bodily comfort while they vex us with economic l political problems, had not yet made their pearance. The America of Civil War days s a country without transcontinental railroads, hout telephones, without European cables, or eless stations, or automobiles, or electric lights, sky-scrapers, or million-dollar hotels, or trolley s, or a thousand other contrivances that today ply the conveniences and comforts of what we l our American civilization. The cities of that

period, with their unsewered and unpaved stree
their dingy, flickering gaslights, their ambli
horse-cars, and their hideous slums, seemed a
propriate settings for the unformed social life a
the rough-and-ready political methods of Americ
democracy. The railroads, with their fragile ir
rails, their little wheezy locomotives, their wood
bridges, their unheated coaches, and their ker
sene lamps, fairly typified the prevailing fronti
business and economic organization. But only
talking with the business leaders of that time cou
we have understood the changes that have tak
place in fifty years. For the most part we speak
business language which our fathers and gran
fathers would not have comprehended. The wo
"trust" had not become a part of their vocabular
"restraint of trade" was a phrase which only t
antiquarian lawyer could have interpreted; "i
terlocking directorates," "holding companies
"subsidiaries," "underwriting syndicates," a
"community of interest" — all this jargon
modern business would have signified nothing
our immediate ancestors. Our nation of 1865 w
a nation of farmers, city artisans, and industriou
independent business men, and small-scale man
facturers. Millionaires, though they were n

nown, did not swarm all over the land. Lux-
, though it had made great progress in the latter
rs of the war, had not become the American
ndard of well-being. The industrial story of the
ted States in the last fifty years is the story of
most amazing economic transformation that
world has ever known; a change which is fitly
ified in the evolution of the independent oil-
ler of western Pennsylvania into the Standard
Company, and of the ancient open air forge on
banks of the Allegheny into the United States
el Corporation.

The slow, unceasing ages had been accumulating
priceless inheritance for the American people.
arly all of their natural resources, in 1865, were
l lying fallow, and even undiscovered in many
ances. Americans had begun, it is true, to
loit their more obvious, external wealth, their
sts and their land; the first had made them one
the world's two greatest shipbuilding nations,
le the second had furnished a large part of the
ources that had enabled the Federal Govern-
nt to fight what was, up to that time, the great-
war in history. But the extensive prairie plains
ose settlement was to follow the railroad exten-
ns of the sixties and the seventies — Kansas,

Nebraska, Iowa, Oklahoma, Minnesota, the Dako
tas — had been only slightly penetrated. Thi
region, with a rainfall not too abundant and no
too scanty, with a cultivable soil extending fro
eight inches to twenty feet under the ground, wit
hardly a rock in its whole extent, with scarcely
tree, except where it bordered on the streams, ha
been pronounced by competent scientists the fines
farming country to which man has ever set th
plow. Our mineral wealth was likewise lying every
where ready to the uses of the new generation
The United States now supplies the world with ha
its copper, but in 1865 it was importing a consider
able part of its own supply. It was not till 185
that the first "oil gusher" of western Pennsylvani
opened up an entirely new source of wealth
Though we had the largest coal deposits known t
geologists, we were bringing large supplies of thi
indispensable necessity from Nova Scotia. It ha
been said that coal and iron are the two minera
products that have chiefly affected modern civil
ization. Certainly the nations that have made th
greatest progress industrially and commerciall
— England, Germany, America — are the thre
that possess these minerals in largest amount
From sixty to seventy per cent of all the know

coal deposits in the world were located in our national domain. Nature had given no other nation anything even remotely comparable to the four hundred and eighty square miles of anthracite in western Pennsylvania and West Virginia. Enormous fields of bituminous lay in those Appalachian ranges extending from Pennsylvania to Alabama, in Michigan, in the Rocky Mountains, and in the Pacific regions. In speaking of our iron it is necessary to use terms that are even more extravagant. From colonial times Americans had worked the iron ore plentifully scattered along the Atlantic coast, but the greatest field of all, that in Minnesota, had not been scratched. From the settlement of the country up to 1869 it had mined only 50,000,000 tons of iron ore; while up to 1910 we had produced 685,000,000 tons. The streams and waterfalls that, in the next sixty years, were to furnish the power that would light our cities, propel our street-cars, drive our transcontinental trains across the mountains, and perform numerous domestic services, were running their useless courses to the sea.

Industrial America is a product of the decades succeeding the Civil War; yet even in 1865 we were a large manufacturing nation. The leading

characteristic of our industries, as compared wit
present conditions, was that they were individu
alized. Nearly all had outgrown the household
stage, the factory system had gained a footho
in nearly every line, even the corporation had mad
its appearance, yet small-scale production prevaile
in practically every field. In the decade preced
ing the War, vans were still making regular trip
through New England and the Middle States, leav
ing at farmhouses bundles of straw plait, which th
members of the household fashioned into hats
The farmers' wives and daughters still supple
mented the family income by working on goods fo
city dealers in ready-made clothing. We can sti
see in Massachusetts rural towns the little sho
shops in which the predecessors of the existing fac
tory workers soled and heeled the shoes which sho
our armies in the early days of the Civil Wa
Every city and town had its own slaughter house
New York had more than two hundred; what
now Fifth Avenue was frequently encumbered b
large droves of cattle, and great stockyards oc
cupied territory which is now used for beautifu
clubs, railroad stations, hotels, and the highes
class of retail establishments.

In this period before the Civil War compara

ely small single owners, or frequently copartner-
ps, controlled practically every industrial field.
lividual proprietors, not uncommonly powerful
nilies which were almost feudal in character,
ned the great cotton and woolen mills of New
gland. Separate proprietors, likewise, con-
lled the iron and steel factories of New York
te and Pennsylvania. Indeed it was not until
War that corporations entered the iron indus-
, now regarded as the field above all others
apted to this kind of organization. The manu-
ture of sewing machines, firearms, and agricul-
al implements started on a great scale in the
il War; still, the prevailing unit was the private
ner or the partnership. In many manufacturing
es the joint stock company had become the pre-
ling organization, but even in these fields the
ment that so characterizes our own age, that of
mbination, was exerting practically no influence.
Competition was the order of the day: the indus-
al warfare of the sixties was a free-for-all. A
re reference to the status of manufactures in
ich the trust is now the all-prevailing fact will
ke the contrast clear. In 1865 thousands of in-
pendent companies were drilling oil in Pennsyl-
nia and there were more than two hundred which

were refining the product. Nearly four hundre
and fifty operators were mining coal, not eve
dimly foreseeing the day when their business woul
become a great railroad monopoly. The two hun
dred companies that were making mowers an
reapers, seventy-five of them located in New Yor
State, had formed no mental picture of the futur
International Harvester Company. One of ou
first large industrial combinations was that whic
in the early seventies absorbed the manufacture
of salt; yet the close of the Civil War found fift
competing companies making salt in the Saginaw
Valley of Michigan. In the same State, about fift
distinct ownerships controlled the copper mine
while in Nevada the Comstock Lode had mor
than one hundred proprietors. The modern trus
movement has now absorbed even our lumber an
mineral lands, but in 1865 these rich resource
were parceled out among a multiplicity of owner
No business has offered greater opportunities to th
modern promoter of combinations than our stree
railways. In 1865 most of our large cities ha
their leisurely horse-car systems, yet practicall
every avenue had its independent line. New Yor
had thirty separate companies engaged in the bus
ness of local transportation. Indeed the Civil Wa

iod developed only one corporation that could described as a "trust" in the modern sense. is was the Western Union Telegraph Company. redible as it may seem, more than fifty com- nies, ten years before the Civil War, were en- ged in the business of transmitting telegraphic ssages. These companies had built their tele- aph lines precisely as the railroads had laid their cks; that is, independent lines were constructed nnecting two given points. It was inevitable, course, that all these scattered lines should come der a single control, for the public convenience uld not be served otherwise. This combination as effected a few years before the War, when the estern Union Telegraph Company, after a long d fierce contest, succeeded in absorbing all its mpetitors. Similar forces were bringing to- ther certain continuous lines of railways, but the eation of huge trunk systems had not yet taken ace. How far our industrial era is removed from at of fifty years ago is apparent when we recall at the proposed capitalization of $15,000,000, used by the merging of the Boston and Worcester d the Western railroads, was widely denounced s "monstrous" and as a corrupting force that ould destroy our Republican institutions.

Naturally this small-scale ownership was reflected in the distribution of wealth. The "swollen fortunes" of that period rested upon the same foundation that had given stability for centuries to the aristocracies of Europe. Social preëminence in large cities rested almost entirely upon the ownership of land. The Astors, the Goelets, the Rhinelanders, the Beekmans, the Brevoorts, and practically all the mighty families that ruled the old Knickerbocker aristocracy in New York were huge landed proprietors. Their fortunes thus had precisely the same foundation as that of the Prussian Junkers today. But their accumulations compared only faintly with the fortunes that are commonplace now. How many "millionaires" there were fifty years ago we do not precisely know. The only definite information we have is a pamphlet published in 1855 by Moses Yale Beach, proprietor of the *New York Sun*, on the "Wealthy Men of New York." This records the names of nineteen citizens who, in the estimation of well-qualified judges, possessed more than a million dollars each. The richest man in the list was William B. Astor, whose estate is estimated at $6,000,000. The next richest man was Stephen Whitney, also a large landowner, whose fortune is listed at

5,000,000. Then comes James Lenox, again a anded proprietor, with $3,000,000. The man who vas to accumulate the first monstrous American ortune, Cornelius Vanderbilt, is accredited with paltry $1,500,000. Mr. Beach's little pamphlet heds the utmost light upon the economic era preeding the Civil War. It really pictures an industrial organization that belongs as much to ancient istory as the empire of the Cæsars. His study sts about one thousand of New York's "wealthy itizens." Yet the fact that a man qualified for ntrance into this Valhalla who had $100,000 to his redit and that nine-tenths of those so chosen possessed only that amount shows the progress concentrated riches have made in sixty years. How nany New Yorkers of today would look upon a nan with $100,000 as "wealthy"?

The sources of these fortunes also show the economic changes our country has undergone. Today, when we think of our much exploited millionaires, the phrase "captains of industry" is the accepted description; in Mr. Beach's time the popular designation was "merchant prince." His catalogue contains no "oil magnates" or "steel kings" or "railroad manipulators"; nearly all the industrial giants of ante-bellum times — as

distinguished from the socially prominent whose wealth was inherited — had heaped together their accumulations in humdrum trade. Perhaps Peter Cooper, who had made a million dollars in the manufacture of isinglass and glue, and George Law whose gains, equally large, represented fortunate speculations in street railroads, faintly suggest the approaching era; yet the fortunes which are really typical are those of William Aspinwall, who made $4,000,000 in the shipping business, of A. T. Stewart, whose $2,000,000 represented his earnings as a retail and wholesale dry goods merchant, and of Peter Harmony, whose $1,000,000 had been derived from happy trade ventures in Cuba and Spain. Many of the reservoirs of this ante-bellum wealth sound strangely in our modern ears. John Haggerty had made $1,000,000 as an auctioneer; William L. Coggeswell had made half as much as a wine importer; Japhet Bishop had rounded out an honest $600,000 from the profits of a hardware store; while Phineas T. Barnum ranks high in the list by virtue of $800,000 accumulated in a business which it is hardly necessary to specify. Indeed his name and that of the great landlords are almost the only ones in this list that have descended to posterity. Yet they were the

Rockefellers, the Carnegies, the Harrimans, the Fricks, and the Henry Fords of their day.

Before the Civil War had ended, however, the transformation of the United States from a nation of farmers and small-scale manufacturers to a highly organized industrial state had begun. Probably the most important single influence was the War itself. Those four years of bitter conflict illustrate, perhaps more graphically than any similar event in history, the power which military operations may exercise in stimulating all the productive forces of a people. In thickly settled nations, with few dormant resources and with practically no areas of unoccupied land, a long war usually produces industrial disorganization and financial exhaustion. The Napoleonic wars had this effect in Europe; in particular they caused a period of social and industrial distress in England. The few years immediately following Waterloo marked a period when starving mobs rioted in the streets of London, setting fire to the houses of the aristocracy and stoning the Prince Regent whenever he dared to show his head in public, when cotton spindles ceased to turn, when collieries closed down, when jails and workhouses were overflowing with a wretched proletariat, and when gaunt and

homeless women and children crowded the country highways. No such disorders followed the Civil War in this country, at least in the North and West. Spiritually the struggle accomplished much in awakening the nation to a consciousness of its great opportunities. The fact that we could spend more than a million dollars a day — expenditures that hardly seem startling in amount now, but which were almost unprecedented then — and that soon after hostilities ceased we rapidly paid off our large debt, directed the attention of foreign capitalists to our resources, and gave them the utmost confidence in this new investment field. Immigration, too, started after the war at a rate hitherto without parallel in our annals. The Germans who had come in the years preceding the Civil War had been largely political refugees and democratic idealists, but now, in much larger numbers, began the influx of north and south Germans whose dominating motive was economic. These Germans began to find their way to the farms of the Mississippi Valley; the Irish began once more to crowd our cities; the Slavs gravitated towards the mines of Pennsylvania; the Scandinavians settled whole counties of certain northwestern States; while the Jews began that conquest of the tailoring

ndustries that was ultimately to make them he clothiers of a hundred million people. For his industrial development, America supplied he land, the resources, and the business leaders, while Europe furnished the liquid capital and the laborers.

Even more directly did the War stimulate our ndustrial development. Perhaps the greatest effect was the way in which it changed our transportation system. The mere necessity of constantly transporting hundreds of thousands of troops and war supplies demanded reconstruction and reëquipment on an extensive scale. The American Civil War was the first great conflict in which railroads played a conspicuous military part, and their development during those four years naturally left them in a strong position to meet the new necessities of peace. One of the first effects of the War was to close the Mississippi River; consequently the products of the Western farms had to go east by railroad, and this fact led to that preëminence of the great trunk lines which they retain to this day. Almost overnight Chicago became the great Western shipping center, and though the river boats lingered for a time on the Ohio and the Mississippi they grew fewer year

by year. Prosperity, greater than the country had ever known, prevailed everywhere in the North throughout the last two years of the War.

So, too, feeding and supplying an army of millions of men laid the foundation of many of our greatest industries. The Northern soldiers in the early days of the war were clothed in garments so variegated that they sometimes had trouble in telling friend from foe, and not infrequently they shot at one another; so inadequately were our woolen mills prepared to supply their uniforms! But larger government contracts enabled the proprietors to reconstruct their mills, install modern machines, and build up an organization and a prosperous business that still endures. Making boots and shoes for Northern soldiers laid the foundation of America's great shoe industry. Machinery had already been applied to shoe manufacture, but only to a limited extent; under the pressure of war conditions, however, American inventive skill found ways of performing mechanically almost all the operations that had formerly been done by hand. The McKay sewing machine, one of the greatest of our inventions, which was perfected in the second year of the war, did as much perhaps as any single device to keep our soldiers

ell shod and comfortable. The necessity of feed-
g these same armies created our great packing
ants. Though McCormick had invented his
aper several years before the war, the new agri-
ultural machinery had made no great headway.
Vithout this machinery, however, our Western
rmers could never have harvested the gigantic
ops which not only fed our soldiers but laid the
asis of our economic prosperity. Thus the War
irectly established one of the greatest, and cer-
inly one of the most romantic, of our industries
– that of agricultural machinery.

Above all, however, the victory at Appomattox
hrew upon the country more than a million un-
mployed men. Our European critics predicted
hat their return to civil life would produce dire
ocial and political consequences. But these
ritics were thinking in terms of their own coun-
ries; they failed to consider that the United
tates had an immense unoccupied domain which
as waiting for development. The men who
ought the Civil War had demonstrated precisely
he adventurous, hardy instincts which were most
eeded in this great enterprise. Even before the
Var ended, a great immigration started towards
he mines and farms of the trans-Mississippi

country. There was probably no important town or district west of the Alleghanies that did not absorb a considerable number. In most instances, too, our ex-soldiers became leaders in these new communities. Perhaps this movement has its most typical and picturesque illustration in the extent to which the Northern soldiers opened up the oil-producing regions of western Pennsylvania. Venango County, where this great development started, boasted that it had more ex-soldiers than any similar section of the United States.

The Civil War period also forced into prominence a few men whose methods and whose achievements indicated, even though roughly and indistinctly, a new type of industrial leadership. Every period has its outstanding figure and, when the Civil War was approaching its end, one personality had emerged from the humdrum characters of the time — one man who, in energy, imagination, and genius, displayed the forces that were to create a new American world. Although this man employed his great talents in a field, that of railroad transportation, which lies outside the scope of the present volume, yet in this comprehensive view I may take Cornelius Vanderbilt as the symbol that links the old industrial era with the new. He is worthy of

more detailed study than he has ever received, for
n personality and accomplishments Vanderbilt is
he most romantic figure in the history of American
nance. We must remember that Vanderbilt was
orn in 1794 and that at the time we are consider-
ng he was seventy-one years old. In the matter
f years, therefore, his career apparently belongs
o the ante-bellum days, yet the most remarkable
act about this remarkable man is that his real life
ork did not begin until he had passed his seven-
ieth year. In 1865 Vanderbilt's fortune, consist-
ng chiefly of a fleet of steamboats, amounted to
bout $10,000,000; he died twelve years later, in
877, leaving $104,000,000, the first of those co-
ossal American fortunes that were destined to
stound the world. The mere fact that this for-
une was the accumulated profit of only ten years
hows perhaps more eloquently than any other cir-
umstance that the United States had entered a
ew economic age. That new factor in the life of
merica and the world, the railroad, explains his
chievement. Vanderbilt was one of the most as-
onishing characters in our history. His physical
xterior made him perhaps the most imposing fig-
re in New York. In his old age, at seventy-three,
anderbilt married his second wife, a beautiful

Southern widow who had just turned her thirtiet
year, and the appearance of the two, sitting side b
side in one of the Commodore's smartest turnouts
driving recklessly behind a pair of the fastest trot
ters of the day, was a common sight in Centra
Park. Nor did Vanderbilt look incongruous i
this brilliant setting. His tall and powerful fram
was still erect, and his large, defiant head, rudd
cheeks, sparkling, deep-set black eyes, and snow
white hair and whiskers, made him look every inc
the Commodore. These public appearances lent
pleasanter and more sentimental aspect to Vander
bilt's life than his intimates always perceived. Fo
his manners were harsh and uncouth; he was totall
without education and could write hardly half
dozen lines without outraging the spelling-book
Though he loved his race-horses, had a fondness fo
music, and could sit through long winter evening
while his young wife sang old Southern ballads
Vanderbilt's ungovernable temper had placed hin
on bad terms with nearly all his children — h
had had thirteen, of whom eleven survived him —
who contested his will and exposed all his eccentri
cities to public view on the ground that the ma
who created the New York Central system was ac
tually insane. Vanderbilt's methods and his tem

perament presented such a contrast to the commonplace minds which had previously dominated American business that this explanation of his career is perhaps not surprising. He saw things in their largest aspects and in his big transactions he seemed to act almost on impulse and intuition. He could never explain the mental processes by which he arrived at important decisions, though these decisions themselves were invariably sound. He seems to have had, as he himself frequently said, almost a seer-like faculty. He saw visions, and he believed in dreams and in signs. The greatest practical genius of his time was a frequent attendant at spiritualistic seances; he cultivated personally the society of mediums, and in sickness he usually resorted to mental healers, mesmerists, and clairvoyants. Before making investments or embarking in his great railroad ventures, Vanderbilt visited spiritualists; we have one circumstantial account of his summoning the wraith of Jim Fiske to advise him in stock operations. His excessive vanity led him to print his picture on all the Lake Shore bonds; he proposed to New York City the construction in Central Park of a large monument that would commemorate, side by side, the names of Vanderbilt and Washington; and he actually

erected a large statue to himself in his new Hudson River station in St. John's Park. His attitude towards the public was shown in his remark when one of his associates told him that "each and every one" of certain transactions which he had just forced through "is absolutely forbidden by the statutes of the State of New York." "My God, John!" said the Commodore, "you don't suppose you can run a railroad in accordance with the statutes of the State of New York, do you?" "Law!" he once roared on a similar occasion, "What do I care about law? Hain't I got the power?"

These things of course were the excrescences of an extremely vital, overflowing, imaginative, energetic human being; they are traits that not infrequently accompany genius. And the work which Vanderbilt did remains an essential part of our economic organization today. Before his time a trip to Chicago meant that the passenger changed trains seventeen times, and that all freight had to be unloaded at a similar number of places, carted across towns, and reloaded into other trains. The magnificent railroad highway that extends up the banks of the Hudson, through the Mohawk Valley and alongside the borders of Lake Erie — a water-line route nearly the entire distance — was all built

seless. It is true that not all the consolidation f these lines was Vanderbilt's work. In 1853 ertain millionaires and politicians had linked to- ether the several separate lines extending from lbany to Buffalo, but they had managed the new oad so wretchedly that the largest stockholders in 867 begged Vanderbilt to take over the control. y 1873 the Commodore had acquired the Hudson iver, extending from New York to Albany, the ew York Central extending from Albany to Buf- lo, and the Lake Shore which ran from Buffalo to hicago. In a few years these roads had been con- olidated into a smoothly operating system. If, in ansforming these discordant railroads into one, anderbilt bribed legislatures and corrupted courts, he engaged in the largest stock-watering opera- ons on record up to that time, and took advantage f inside information to make huge winnings on the tock exchange, he also ripped up the old iron rails nd relaid them with steel, put down four tracks here formerly there had been two, replaced wood- n bridges with steel, discarded the old locomotives or new and more powerful ones, built splendid new erminals, introduced economies in a hundred di- ections, cut down the hours required in a New ork–Chicago trip from fifty to twenty-four, made

his highway an expeditious line for transporting freight, and transformed railroads that had formerly been the playthings of Wall Street and that frequently could not meet their pay-rolls into exceedingly profitable, high dividend paying properties. In this operation Vanderbilt typified the era that was dawning — an era of ruthlessness, of personal selfishness, of corruption, of disregard of private rights, of contempt for law and legislatures, and yet of vast and beneficial achievement. The men of this time may have traveled roughshod to their goal, but after all, they opened up, in an amazingly short time, a mighty continent to the uses of mankind. The triumph of the New York Central and Hudson River Railroad under Vanderbilt, a triumph which dazzled European investors as well as our own, and which represented an entirely different business organization from anything the nation had hitherto seen, appropriately ushered in the new business era whose outlines will be sketched in the succeeding pages.

CHAPTER II

THE FIRST GREAT AMERICAN TRUST

WHEN Cornelius Vanderbilt died in 1877, America's rst great industrial combination had become an tablished fact. In that year the Standard Oil ompany of Ohio controlled at least ninety per nt of the business of refining and marketing etroleum. A new portent had appeared in our conomic life, a phenomenon that was destined affect not only the social and business existnce of the every-day American but even his potical and legal institutions.

It seems natural enough at the present time to efer to petroleum as an indispensable commodity. t the beginning of the Civil War, however, any uch description would have been absurd. Though etroleum was not unknown, millions of American ouseholds were still burning candles, whale oil, nd other illuminants. Not until 1859 did our ncestors realize that, concealed in the rocks of

western Pennsylvania, lay apparently inexhaustible quantities of a liquid which, when refined, would give a light exceeding in brilliancy anything the world had hitherto known. The mere existence of petroleum, it is true, had been a familiar fact for centuries. Herodotus mentions the oil pits of Babylon, and Pliny informs us that this oil was actually used for lighting in certain parts of Sicily. It had never become an object of universal use, simply because no one had discovered how to obtain it in sufficient quantities. No one had suspected, indeed, that petroleum existed practically in the form of great subterranean rivers, lakes, or even seas. For ages this great natural treasure had been seeking to advertise its presence by occasionally seeping through the rocks and appearing on the surface of watercourses. It had been doing this all over the world — in China, in Russia, in Germany, in England, in our own country. Yet our obtuse ancestors had for centuries refused to take the hint. We can find much cause for self-congratulation in that it was apparently the American mind that first acted upon this obvious suggestion.

In Venango County, Pennsylvania, petroleum floated in such quantities on the surface of a branch of the Allegheny River that this small watercourse

ad for generations been known as Oil Creek. The eighboring farmers used to collect the oil and se it to grease their wagon axles; others, more en-erprising, made a business of gathering the float-ng substance, packing it in bottles, and selling it roadcast as a medicine. The most famous of these oncoctions, "Seneca Oil," was widely advertised s a sure cure for rheumatism, and had an extensive ale in this country. "Kier's Rock Oil" afterwards ad an even more extended use. Samuel M. Kier, ho exploited this comprehensive cure-all, made no asting contributions to medical science, but his ethod of obtaining his medicament led indirectly o the establishment of a great industry. In this estern Pennsylvania region salt manufacture had een a thriving business for many years; the salt as obtained from salt water by means of arte-ian wells. This salt water usually came to the sur-ace contaminated with that same evil-smelling oil hich floated so constantly on top of the rivers nd brooks. The salt makers spent much time nd money "purifying" their water from this sub-tance, never apparently suspecting that the really aluable product of their wells was not the salt ater they so carefully preserved, but the petro-eum which they threw away. Samuel M. Kier was

originally a salt manufacturer; more canny than h competitors, he sold the oil which came up with h water as a patent medicine. In order to give a my terious virtue to this remedy, Kier printed on h labels the information that it had been "pumpe up with salt water about four hundred feet belo the earth's surface." His labels also contained th convincing picture of an artesian well — a roug woodcut which really laid the foundation of th Standard Oil Company.

In the late fifties Mr. George H. Bissell had b come interested in rock oil, not as an embrocatio and as a cure for most human ills, but as a ligh giving material. A professor at Dartmouth ha performed certain experiments with this substanc which had sunk deeply into Bissell's imaginatio So convinced was this young man that he coul introduce petroleum commercially that he lease certain fields in western Pennsylvania and sent specimen of the oil to Benjamin Silliman, Jr., Pro fessor of Chemistry at Yale. Professor Sillima gave the product a more complete analysis than i had ever previously received and submitted a re port which is still the great classic in the scientifi literature of petroleum. This report informed Bis sell that the substance could be refined cheaply an

sily, and that, when refined, it made a splendid uminant, besides yielding certain by-products, ch as paraffin and naphtha, which had a great mmercial value. So far, Bissell's enterprise emed to promise success, yet the great problem ill remained: how could he obtain this rock oil amounts large enough to make his enterprise a ractical one? A chance glimpse of Kier's label, ith its picture of an artesian well, supplied Bissell ith his answer. He at once sent E. L. Drake into ne oil-fields with a complete drilling equipment, to ook, not for salt water, but for oil. Nothing seems uite so obvious today as drilling a well into the ock to discover oil, yet so strange was the idea in rake's time that the people of Titusville, where e started work, regarded him as a lunatic and anifested a hostility to his enterprise that de- ayed operations for several months. Yet one day n August, 1859, the coveted liquid began flowing rom "Drake's folly" at the rate of twenty-five arrels a day.

Because of this performance Drake has gone own to fame as the man who "discovered oil." n the sense that his operation made petroleum vailable to the uses of mankind, Drake was its liscoverer, and his achievement seems really a

greater one than that of the men who first made apparent our beds of coal, iron, copper, or even gold. For Drake really uncovered an entirely new substance. And the country responded spontaneously to Drake's success. For anything approaching the sudden rush to the oil-fields we shall have to go to the discovery of gold in California ten years before. Men flocked into western Pennsylvania by the thousands; fortunes were made and lost almost instantaneously. Oil flowed so plentifully in this region that it frequently ran upon the ground, and the "gusher," which threw a stream of the precious liquid sometimes a hundred feet and more into the air, became an almost every-day occurrence. The discovery took the whole section by surprise; there were no towns, no railways, and no wagon roads except a few almost impassable lumber trails. Yet, almost in a twinkling, the whole situation changed; towns sprang up overnight roads were built, over which teamsters could carry the oil to the nearest shipping points, and the great trunk lines began to extend branches into the regions. The one thing, next to Drake's well, that made the oil available, was the discovery, which was made by Samuel Van Syckel, that a two-inch pipe, starting at the well, could convey the oil for

veral miles to the nearest railway station. In a w years the whole oil region of Venango County as an inextricable tangle of these primitive pipe nes.

Thus, before the Civil War had ended, the west- n Pennsylvania wilderness had been transformed to the busy headquarters of a new industry. ompanies had been formed, many of them the ildest stock-jobbing operations, refineries had een started, in a few years the whalers of New ngland had almost lost their occupation, but mil- ons of American homes, that had hitherto had to pend the long winter evenings almost in darkness, ddenly found themselves flooded with light. In leveland, in Pittsburgh, in Philadelphia, in New ork, and in the oil regions, the business of refin- ng and selling petroleum had reached extensive roportions. Europe, although it had great un- eveloped oil-fields of its own, drew upon this new merican enterprise to such an extent that, eleven ears after Drake's "discovery," petroleum had aken fourth place among our exported articles.

The very year that Bissell had organized his pe- roleum company a boy of sixteen had obtained his irst job in a produce commission office on a dock in Cleveland. As the curtain rises on the career of

John D. Rockefeller, we see him perched upon a high stool, adding up figures and casting accounts, faithfully doing every odd office job that came his way, earning his employer's respect for his industry, his sobriety, and his unmistakable talents for business. Nor does this picture inadequately visualize Rockefeller's whole after-life, and explain the business qualities that made possible his unexampled success. It is, indeed, the scene to which Mr. Rockefeller himself most frequently reverts when, in his famous autobiographical discourses to his Cleveland Sunday School, he calls our attention to the rules that inevitably lead to industrial prosperity. "Thrift, thrift, Horatio," is the one idea upon which the great captain of the oil business has always insisted. Many have detected in these habits of mind only the cheese-paring activities of a naturally narrow spirit. Rockefeller's old Cleveland associates remember him as the greatest bargainer they had ever known, as a man who had an eye for infinite details and an unquenchable patience and resource in making economies. Yet Rockefeller was clearly more than a pertinacious haggler over trifles. Certainly such a diagnosis does not explain a man who has built up one of the world's greatest organizations and accumulated

he largest fortune which has ever been placed at he disposal of one man. Indeed, Rockefeller dis-layed unusual business ability even before he ntered the oil business. A young man who, at he age of nineteen, could start a commission ouse and do a business of nearly five hundred housand the first year must have had commer-ial capacity to an extraordinary degree.

Fate had placed Rockefeller in Cleveland in the lays when the oil business had got well under way. n the early sixties a score or so of refineries had tarted in this town, many of which were making arge profits. It is not surprising that Rockefeller, azing at these black and evil-smelling buildings rom the vantage point of his commission office, hould have felt an impulse to join in the gamble. He plunged into this new activity at the age of wenty-three. He possessed two great advantages ver most of his adventurous competitors; one was a heavy bank account, representing his earnings in he commission business, and the other a partner, Samuel Andrews, who was generally regarded as a mechanical genius in the production of illuminating oil. At the beginning, therefore, Rockefeller had the two essentials which largely explain his sub-sequent career; an adequate liquid capital and

high technical resources. In the first few years the Rockefeller houses — he rapidly organized three, one after another — competed with a large number of other units in the oil business on somewhat more than even terms. At this time Rockefeller was merely one of a large number of successful oil refiners, yet during these early days a grandiose scheme was taking shape in that quiet, insinuating, far-reaching brain. He said nothing about it, even to his closest associates, yet it filled his every waking hour. For this young man was taking a comprehensive sweep of the world and he saw millions of people, in the Americas, in Europe, and in Asia, whose need for the article in which he dealt would grow more insistent every day. He saw that he was handling a product which was becoming as much a necessity of life as the air itself. The young man reached out to grasp this business. "All of it," we can picture Rockefeller saying to himself, "all of it shall be mine." Any study of Rockefeller's career must lead to the conclusion that, before he had reached his thirtieth year, he had determined to monopolize this growing necessity. The mere fact that this young man could form such a stupendous plan indicates that in him we are meeting for the first time a new type

industrial leader. At that time monopolies ere unknown in the United States. That certain d English Kings had frequently granted exclu- ve trading privileges to favored merchants most lucated Americans knew; and their knowledge of onopolies extended little further than this. Yet bout 1868 John D. Rockefeller started consciously revive this ancient practice, and to bring under ne ownership the magnificent industry to which rake's sensational discovery had given rise.

Daring as was this conception, the resourceful- ess and the skill with which Rockefeller executed were more startling still. Merely to catalogue, ne by one, the achievements of the ten succeed- ng fruitful years, almost takes one's breath away. ndeed the whole operation proceeded with such Napoleonic rapidity of action that the outside vorld had hardly grasped Rockefeller's intention efore the monopoly had been made complete. We atch one glimpse of Rockefeller, in 1868, as head of he prosperous house of Rockefeller, Andrews, and Flagler, and eight years afterwards we see him once nore, this time the man who controlled practically he entire petroleum business of the world. His career of conquest began in 1870, when the firm of Rockefeller, Andrews, and Flagler, joining hands

with several large capitalists in Cleveland and New York, was incorporated under the name of the Standard Oil Company of Ohio. In 1870 about twenty-five independent refineries, many of them prosperous and powerful, were manufacturing oil in the city of Cleveland; two years afterward this new Standard Oil Company had absorbed all of them except five. In these two critical years the oil business of the largest refining center in the United States had thus passed into Rockefeller's hands. By 1874 the greatest refineries in New York and Philadelphia had likewise merged their identity with his own. When Rockefeller began his acquisition, there were thirty independent refineries operating in Pittsburgh, all of which, in four or five years, passed one by one under his control. The largest refineries of Baltimore surrendered in 1875.

These capitulations left only one important refining headquarters in the United States which the Standard had not absorbed. This was that section of western Pennsylvania where the oil business had had its origin. The mere fact that this area was the headquarters of the oil supply gave it great advantages as a place for manufacturing the finished product. The oil regions regarded these advantages as giving them the right to dominate the

rowing industry, and they had frequently pro-laimed the doctrine that the business belonged to hem. They hated Rockefeller as much as they eared him, yet at the very moment when the Ti-usville operators were hanging him in effigy and osting the hoardings with cabalistic signs against is corporation, this mysterious, almost uncanny ower was encircling them. Men who one night ere addressing public meetings denouncing the tandard influence would suddenly sell out their oldings the next day. In 1875 John D. Archbold, brilliant young refiner who had grown up in the il regions and who had gained much local fame as pponent of the Standard, appeared in Titusville as he President of the Acme Oil Company. At that ime there were twenty-seven independent refiner-es in this section. Archbold began buying and easing these establishments for his Acme Com-pany, and in about four years practically every ne had passed under his control. The Acme Com-pany was merely a subsidiary of the Standard Oil.

These rapid purchasing campaigns gave the Standard ninety per cent of all the refineries in the United States, but Rockefeller's scheme compre-hended more than the acquisition of refineries. In the main the Rockefeller group left the production

of crude oil in the hands of the private drillers, but practically every other branch of the business passed ultimately into their hands. Both the New York Central and the Erie railroads surrendered to the Standard the large oil terminal stations which they had maintained for years in New York. As a consequence, the Standard obtained complete supervision of all oil sent by railroad into New York, and it also secured the machinery of a complete espionage system over the business of competitors. The Standard acquired companies which had built up a large business in marketing oil. Even more dramatic was its success in gathering up, one after another, these pipe lines which represented the circulatory system of the oil industry. In the early days these pipe lines were small and comparatively simple affairs. They merely carried the crude oil from the wells to railroad centers; from these stations the railroads transported it to the refineries at Cleveland, New York, and other places. At an early day the construction and management of these pipe lines became a separate industry. And now, in 1873, the Standard Oil Company secured possession of a one-third interest in the largest of these privately owned companies, the American Transfer Company. Soon afterward the

nited Pipe Line Company went under their con-
ol. In 1877 the Empire Transportation Com-
any, a large pipe line and refining corporation
hich the Pennsylvania Railroad had controlled
r many years, became a Standard subsidiary.

Meanwhile certain hardy spirits in the oil regions
ad conceived a much more ambitious plan. Why
ot build great underground mains directly from
ie oil regions to the seaboard, pump the crude oil
irectly to the city refineries, and thus free them-
lves from dependence on the railroads? At first
ie idea of pumping oil through pipes over the Alle-
nany Mountains seemed grotesque, but competent
ngineers gave their indorsement to the plan. A
rtain "Dr." Hostetter built for the Columbia
onduit Company a trunk pipe line that extended
irty miles from the oil regions to Pittsburgh.
ardly had Hostetter completed his splendid pro-
ct when the Standard Oil capitalists quietly
ppeared and purchased it! For four years an-
ther group struggled with an even more ambitious
heme, the construction of a conduit, five hundred
iles long, from the oil regions to Baltimore. The
merican people looked on admiringly at the splen-
id enterprise whose projectors, led by General
laupt, the builder of the Hoosac Tunnel, struggled

against bankruptcy, strikes, railroad opposition, and hostile legislatures, in their attempts to push their pipe line to the sea. In 1879 the Tidewater Company first began to pump their oil, and the American press hailed their achievement as something that ranked with the laying of the Atlantic Cable and the construction of the Brooklyn Bridge. But in less than two years the Rockefeller interest had entered into agreements with the Tidewater Company that practically placed this great seaboard pipe line in its hands.

Thus in less than ten years Rockefeller had realized his ambitious dream; he now controlled practically everything concerned in the manufacture and sale of petroleum. The change had come about so stealthily, so secretly, and even so remorselessly that it impressed the public almost as the work of some uncanny genius. What were the forces, personal and economic, that had produced this new phenomenon in our business life? In certain particulars the Standard Oil monopoly was the product of well-understood principles. From his earliest days John D. Rockefeller had struggled to eliminate the middleman. He established factories to build his own barrels, to make his own acids; he created his own selling firms, and, instead of paying

ge storage charges, he constructed his own ware-uses in New York. From his earliest days as a finer, he had adopted the principle of paying no an a profit, and of performing all the intermediate ts that had formerly resulted in large tribute middlemen. Moreover, the Standard Oil Com-uny was apparently the first great American in-ustrial enterprise that realized the necessity of erating with an abundant capital. Not the least Mr. Rockefeller's achievements was his success associating with the new company men having eat financial standing — Amasa Stone, Benjamin rewster, Oliver Jennings, and the like, capitalists hose banking resources, placed at the disposi-ion of the Standard, gave it an immense advan-age over its rivals. While his competitors were kiting" checks and waiting, hat in hand, on the ood nature of the money lenders, Rockefeller al-ways had a large bank balance, upon which he ould instantly draw for his operations.

Nor must we overlook the fact that the Standard group contained a large number of exceedingly able men. "They are mighty smart men," said the de-spairing W. H. Vanderbilt, in 1879, when pressed to give his reasons for granting rebates to the Rockefeller group. "I guess if you ever had to deal

with them you would find that out." In Rocke feller the corporation possessed a man of tireles industry and unshakable determination. Nothin could turn him aside from the work to which he ha put his hand. Public criticism and even denuncia tion, while he resented it as unjust and regarded i as the product of a general misunderstanding, neve caused the leader of Standard Oil even momenta rily to flinch. He was a man of one idea, and h worked at it day and night, taking no rest or recrea tion, skillfully turning to his purpose every littl advantage that came his way. His associates — men like Flagler, Archbold, and Rogers — also had unusual talents, and together they built up the splendid organization that still exists. They ex acted from their subordinates the last ounce of at tention and energy and they rewarded generously everybody who served them well. They showed great judgment in establishing refineries at the most strategic points and in giving up localities such as Boston and Portland, which were too far removed from their supplies. They established a marketing system which enabled them to bring their oil directly from their own refineries to the re tailer, all in their own tank cars and tank wagons. They extended their markets in foreign countries,

that now the Standard sells the larger part of its oducts outside the United States. They estab- hed chemical research laboratories which devised w and inexpensive methods for refining the pro- ct and developed invaluable by-products, such paraffin, naphtha, vaseline, and lubricating oils. is impossible to study the career of the Standard l Company without concluding that we have re an example of a supreme business intelligence orking in a field which gave the widest possible ope of action.

A high quality of organization, however, does not mpletely explain the growth of this monopoly. he Standard Oil Company was the beneficiary of ethods that have deservedly received great public oprobrium. Of these the one that stands forth ost conspicuously is the railroad rebate. Those ho have attempted to trace the very origin of the ockefeller preëminence to railroad discrimination ve not entirely succeeded. Only the most hazy idence exists that the firm of Rockefeller, An- ews, and Flagler greatly profited from rebates. fact, refined oil was not transported from Cleve- nd to the seaboard by railroad until 1870, the ar that this firm dissolved; practically all of the oduct then went by way of the Great Lakes and

the Erie Canal. Possibly the Rockefeller firm di get occasional rebates on crude oil from the oi regions to the refineries, but so did their competi tors. It is therefore not likely that such favors ha great influence in making this single firm the mos successful in the largest refining center. With th organization of the Standard Oil Company, how ever, rebates became a more important consider ation.

The turning-point in the history of the oil indus try came when the Rockefeller interests acquire the Cleveland refineries. The details concernin this act of generalship are fairly well known. Th South Improvement Company is a corporatio that necessarily bulks large in the history of th Standard Oil. Mr. Rockefeller and his associate have always disclaimed the parentage of this or ganization. They assert — and their assertion i doubtless true — that the only responsible beget ters were Thomas A. Scott, President of the Penn sylvania Railroad, and certain refineries in Pitts burgh and Philadelphia which, though they wer afterwards absorbed by the Standard, were at tha time their competitors. These refiners and th Pennsylvania, over which the Standard Oil the was making no shipments, thus represented a group

nposed of railroads and refiners, which was an-
gonistic to the Rockefeller interests. The South
provement Company was an association of re-
ers with which the railroads, chiefly the Pennsyl-
nia, the New York Central, and the Erie, made
clusive contracts for shipping oil. Under these
ntracts rates to the seaboard were to be gener-
y raised, though the members of the South Im-
ovement Company were to receive liberal re-
tes. The refiners of Cleveland and Pittsburgh
re to get lower rates than the refiners located
the oil regions. But the clause in these con-
acts that caused the greatest amazement and
dignation was one which gave the inside group
oates on every barrel of oil shipped by its
mpetitors.

It would be difficult to imagine any transaction
ore wicked than these contracts. Carried into
ecution they inevitably meant the extinction of
ery refiner who had not been admitted into the
side ring. Of the two thousand shares of the
uth Improvement Company, the gentlemen who
ere at that time most conspicuously identified
th the Standard Oil Company subscribed to five
ndred and forty. Mr. Rockefeller has always
otested that he did not favor the scheme and that

he became a party to it simply because he could no
afford to antagonize the powerful Pennsylvania
Railroad, which had originated it. When the de
tails became public property, a wave of indignation
swept from the Atlantic to the Pacific; the oi
regions, which would have been the heaviest suffer
ers, shut down their wells and so cut off the supply
of crude oil; the New York newspapers started
"crusade" against the South Improvement group
and Congress ordered an investigation. So fiercely
was the public wrath aroused that the railroads ra
to cover, abrogated the contracts, signed an agree
ment promising never more to grant rebates to any
one, while the Pennsylvania Legislature repealed
the charter of the South Improvement Company.
This particular scheme, therefore, never came to
maturity.

Before the South Improvement Company ended
its corporate existence, however, a great change
had taken place in the oil situation. Practically all
the refineries in Cleveland had passed into the con
trol of the Standard Oil Company. The Standard
has always denied that there was any connection
between the purchase of these great refineries and
the organization of the South Improvement Com
pany. But there is much evidence sustaining

ntrary view, for many of these refiners afterward
ent on the witness stand and told circumstantial
ories, all of which made precisely the same point.
his was that the Standard men had come to them,
own the contracts which had been made by the
outh Improvement Company, and argued that,
nder these new conditions, the refineries left out-
de the combination could not long survive. The
andard's rivals were therefore urged to "come
," to take Standard stock in return for their
fineries, or, if they preferred, to sell outright.
ractically all saw the force in this argument and
ld — in most cases taking cash.

The acquisition of these Cleveland refineries
ade inevitable the Rockefeller conquest of the oil
dustry. Up to that time the Standard had re-
ned about fifteen hundred barrels a day, and now
ddenly its capacity jumped to more than twelve
ousand barrels. This one strategic move had
ade Rockefeller master of about one-third of all
e oil business in the United States, and this fact
xplains the rapidity with which the other citadels
ll. There is no evidence that the Standard exer-
sed any pressure upon the great refineries in New
ork, Pittsburgh, and Philadelphia. Indeed these
oncerns manifested an eagerness to join. The

fact that, unlike the Cleveland refiners, many o the firms in these other cities took Standard stock and so became parts of the new organization, i in itself significant. They evidently realized tha they were casting their fortunes with the winning side. The huge shipments which the Standard now controlled explain this change in front. Every day Mr. Rockefeller could send from Cleveland to the seaboard a train, sixty cars long, loaded with the blue barrels containing his celebrated liquid That was a consideration for which any railroad would at that time sell its soul. And the New York Central road promptly made this sacrifice Hardly had the ink dried on its written promise not to grant any rebates when it began granting them to the Standard Oil Company.

In those days the railroad rate was not the sa cred, immutable thing which it subsequently be came, although the argument for equal treatmen of shippers existed theoretically just as strongly forty years ago as it does today. The rebate was just as illegal then as it is at present; there was no precise statute, it is true, which made i unlawful until the Interstate Commerce Act wa passed in 1887; but the common law had alway prohibited such discriminations. In the seventie

nd eighties, however, railroad men like Cornelius anderbilt and Thomas A. Scott were less inter- sted in legal formalities than in getting freight. hey regarded transportation as a commodity to e bought and sold, like so much sugar or wheat or oal, and they believed that the ordinary principles hich regulated private bargaining should also egulate the sale of the article in which they dealt. ccording to this reasoning, which was utterly false nd iniquitous, but generally prevalent at the time, he man who shipped the largest quantities of oil hould get the lowest rate.

The purchase of the Cleveland refineries made he Standard Oil group the largest shippers and herefore they obtained the most advantageous erms for transporting their product. Under these onditions they naturally obtained the monopoly, he extent of which has been already described. heir competitors could rage, hold public meetings, tart riots, threaten to lynch Mr. Rockefeller and ll his associates, but they could not long survive n face of these advantages. The only way in which he smaller shippers could overcome this handicap as by acquiring new methods of transportation. t was this necessity that inspired the construction f pipe lines; but the Standard, as already de-

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scribed, succeeded in absorbing these just about as rapidly as they were constructed.

Not only did the Standard obtain railroad rebates but it developed the most death-dealing methods in its system of marketing its oil. In these campaigns it certainly overstepped the boundaries of legitimate business, even according to the prevailing morals of its own or of any other time. While it probably did not set fire to rival refineries, as it has sometimes been accused of doing, it undoubtedly did resort to somewhat Prussian methods of destroying the foe. This great corporation divided the United States into several sections, over each of which it appointed an agent, who in turn subdivided his territory into smaller divisions, each one of which likewise had its captain. The order imperatively issued to each agent was, "Sell all the oil that is sold in your district." To these instructions he was rigidly held; success in accomplishing his task meant advancement and an increased salary, with a liberal pension in his old age, whereas failure meant a pitiless dismissal. He was expected to supervise not only his own business, but that of his rivals as well, to obtain access to their accounts, their shipments, and their customers. It has been asserted, and the assertion

as been supported by considerable evidence, that
iese agents did not hesitate to bribe railroad em-
loyees and in this way get access to their competi-
ors' bills of lading and records of their shipments,
nd that they would even bribe dealers to cancel
uch orders and take the oil from them at a lower
rice. This information laid the foundation for
iose price-cutting campaigns that have brought
ie name of the Standard Oil into such disfavor.
nd when the Standard cut, it cut to kill; the only
urpose was to drive the competitor from the field,
nd, when this had been accomplished, the price
f oil would promptly go up again. The organiza-
on of "bogus companies," started purely for the
urpose of eliminating competitors, seems to have
een a not infrequent practice. This latter method
mphasizes another quality that accompanied the
tandard's operations and so largely explains its
npopularity — the secrecy with which it so com-
nonly worked. Though the independent oil re-
ners were combating the most powerful financial
ower of the time, they were frequently fighting in
ie dark, never knowing where to deliver their
lows.

This same characteristic was manifested in the
orm of corporate existence which the Standard

adopted. The first great "trust" was a trust not only in name but in fact. The Standard introduced not only a new economic development into our national organization; it introduced a new word into our language and an issue into American politics that provided sustenance for the presidential campaigns of twenty-five years. From the beginning the Standard Oil had always been a close corporation. Originally it had had only ten stockholders, and this number had gradually grown until, in 1881, there were forty-one. These men had adopted a new and secretive method of combining their increasing possessions into a single ownership. In 1873 the Standard Company had increased its capital stock (originally $1,000,000) to $3,500,000, the new certificates being exchanged for interests in the great New York and Philadelphia refineries. The Standard Oil Company of Ohio never had a larger capital stock than that. As additional properties were acquired, the interests were placed in the hands of trustees, who held them for the joint benefit of the stockholders in the original company. In 1882 this idea was carried further, for then the Standard Oil Trust was organized. The fact that the properties lay in so many different States, many of which had laws intended to curb corporations,

was evidently what led to this form of consolidation. A trust was formed, consisting of nine trustees, who held, for the benefit of the Standard Oil stockholders, all the stock in the Standard and in the subsidiary companies. Instead of certificates of stock the trustees issued certificates of trust amounting to $70,000,000. Each Standard stockholder received twenty of these certificates for each share which he held of Standard stock. These certificates could be bought and sold and passed on by inheritance precisely the same as stocks.

Ingenious as was this legal device, it did not stand the test of the courts. In 1892 the Ohio Supreme Court declared the Standard Oil Trust a violation of the law and demanded its dissolution. The persistent attempts of the Standard to disregard this order increased its reputation for lawlessness. Finally, in 1899, after Ohio had brought another action, the trust was dissolved. The Standard interests now reorganized all their holdings under the name of the Standard Oil Company of New Jersey. Again, in 1911, the United States Supreme Court declared this combination a violation of the Sherman Anti-Trust Act, and ordered its dissolution. By this time the Standard capitalists had learned the value of public opinion as a corpo-

rate asset, and made no attempt to evade the orde of the court. The Standard Oil Company of New Jersey proceeded to apportion among its stock holders the stock which it held in thirty-seven othe companies — refineries, pipe lines, producing com panies, marketing companies, and the like. Chie Justice White, in rendering his decision, specifically ordered that, in dissolving their combination, th Standard should make no agreement, contractua or implied, which was intended still to retain thei properties in one ownership. As less than a doze men owned a majority interest in the Standard Oi Company of New Jersey, these same men naturally continued to own a majority interest in the sub sidiary companies. Though the immediate effec of this famous decision therefore was not to caus a separation in fact, this does not signify that, a time goes on, such a real dissolution will not tak place. It is not unlikely that, in a few years, th transfers of the stock by inheritance or sale wil weaken the consolidated interest to a point wher the companies that made up the Standard Com pany will be distinct and competitive.

This is more likely to be the case since, long befor the decision of 1911, the Standard Oil Company had ceased to be a monopoly. In the early nine

ies there came to the front in the oil regions
man whose organizing ability and indomitable
ill suggested the Standard Oil leaders themselves.
his man's soul burned with an intense hatred of
he Rockefeller group, and this sentiment, as much
s his love of success, inspired all his efforts. There
nothing finer in American business history than
he fifteen years' battle which Lewis Emery, Jr.,
ught against the greatest financial power of the
ay. In 1901 this long struggle met with com-
ete success. Its monuments were the two great
unk pipe lines which Emery had built from
e Pennsylvania regions to Marcus Hook, near
iladelphia, one for pumping refined and one for
mping crude. The Pure Oil Company, Emery's
eation, has survived all its trials and has done
excellent business. And meanwhile other inde-
ndents sprang up with the discovery of oil in
her parts of the country. This discovery first
tonished the Standard Oil men themselves; when
meone suggested to Archbold, thirty-five years
o, that the mid-continent field probably con-
ned large oil supplies, he laughed, and said that
would drink all the oil ever discovered outside
Pennsylvania. In these days a haunting fear
rsued the oil men that the Pennsylvania field

would be exhausted and that their business would be ended. This fear, as developments showed, had a substantial basis; the Pennsylvania yield began to fail in the eighties and nineties, until now it is an inconsiderable element in this gigantic industry. Ohio, Indiana, Illinois, Kansas, Oklahoma, Texas, California, and other States in turn became the scene of the same exciting and adventurous events that had followed the discovery of oil in Pennsylvania. The Standard promptly extended its pipe lines into these new areas, but other great companies also took part in the development. These companies, such as the Gulf Refining Company and the Texas Refining Company, have their gathering pipe lines, their great trunk lines, their marketing stations, and their export trade, like the Standard; the Pure Oil Company has its tank cars, its tank ships, and its barges on the great rivers of Europe. The ending of the rebate system has stimulated the growth of independents, and the production of crude oil and the market demand in a thousand directions has increased the business to an extent which is now far beyond the ability of any one corporation to monopolize. The Standard interests refine perhaps something more than fifty per cent of the crude oil produced in this country

ıt in recent years, Standard Oil has meant more
an a corporation dealing in this natural product.
has become the synonym of a vast financial power
aching in all directions. The enormous profits
ade by the Rockefeller group have found invest-
ents in other fields. The Rockefellers became
e owners of the great Mesaba iron ore range
Minnesota and of the Colorado Fuel and Iron
ompany, the chief competitor of United States
teel. It is the largest factor in several of the
reatest American banks. Above all, it is the single
rgest railroad power in America today.

CHAPTER III

THE EPIC OF STEEL

It was the boast of a Roman Emperor that he ha
found the Eternal City brick and left it marbl
Similarly the present generation of Americans i
herited a country which was wood and have tran
formed it into steel. That which chiefly disti
guishes the physical America of today from tha
of forty years ago is the extensive use of th
metal. Our fathers used steel very little in railwa
transportation; rails and locomotives were usual
made of iron, and wood was the prevailing materi
for railroad bridges. Steel cars, both for passe
gers and for freight, are now everywhere taking th
place of the more flimsy substance. We trav
today in steel subways, transact our business
steel buildings, and live in apartments and priva
houses which are made largely of steel. The ste
automobile has long since supplanted the woode
carriage; the steel ship has displaced the iro

d wooden vessel. The American farmer now closes his lands with steel wire, the Southern anter binds his cotton with steel ties, and modern nerica could never gather her abundant harvests thout her mighty agricultural implements, all which are made of steel. Thus it is steel that elters us, that transports us, that feeds us, and iat even clothes us.

This substance is such a commonplace element our lives that we take it for granted, like air and ater and the soil itself; yet the generation that ught the Civil War knew practically nothing of eel. They were familiar with this metal only as curiosity or as a material used for the finer kinds f cutlery. How many Americans realize that steel as used even less in 1865 than aluminum is used oday? Nearly all the men who have made the merican Steel Age — such as Carnegie, Phipps, rick, and Schwab — are still living and some of iem are even now extremely active. Thirty-five ears ago steel manufacture was regarded, even in iis country, as an almost exclusively British industry. In 1870 the American steel maker was he parvenu of the trade. American railroads purhased their first steel rails in England, and the arly American steel makers went to Sheffield for

their expert workmen. Yet, in little more than t
years, American mills were selling agricultural m
chinery in that same English town, American ra
were displacing the English product in all par
of the world, American locomotives were dra
ing English trains on English railways, and Ame
ican steel bridges were spanning the Ganges a
the Nile. Indeed, the United States soon su
passed England. In the year before the Wor
War the United Kingdom produced 7,500,000 to
of steel a year, while the United States produc
32,000,000 tons. Since the outbreak of the Gre
War, the United States has probably made mo
steel than all the rest of the world put togethe
"The nation that makes the cheapest steel," sa
Mr. Carnegie, "has the other nations at its feet.
When some future Buckle analyzes the fund
mental facts in the World War, he may possib
find that steel precipitated it and that steel d
termined its outcome.

Three circumstances contributed to the rise
this greatest of American industries: a new proce
for cheaply converting molten pig iron into ste
the discovery of enormous deposits of ore in sever
sections of the United States, and the entrance in
the business of a hardy and adventurous group

nufacturers and business men. Our steel industry is thus another triumph of American invene skill, made possible by the richness of our mind resources and the racial energy of our people. elementary scientific discovery introduced the eat steel age. Steel, of course, is merely iron ich has been refined — freed from certain imrities, such as carbon, sulphur, and phosphorus. e refine our iron and turn it into steel precisely we refine our sugar and petroleum. From the ys of Tubal Cain the iron worker had known that at would accomplish this purification; but heat, to almost 1865, was an exceedingly expensive mmodity. For ages iron workers had obtained e finer metal by applying this heat in the form charcoal, never once realizing that unlimited antities of another fuel existed on every hand. he man who first suggested that so commonplace substance as air, blown upon molten pig iron, ould produce the intensest heat and destroy its purities, made possible our steel railroads, our eel ships, and our steel cities. When William elly, an owner of iron works near Eddyville, Kenicky, first proposed this method in 1847, he met ith the ridicule which usually greets the pioneer ventor. When Henry Bessemer, several years

afterward, read a paper before the British Associa
tion for the Advancement of Science, in which h
advocated the same principle, he was roared dow
as "a crazy Frenchman," and the savants were s
humiliated by the suggestion that they voted t
make no record of his "silly paper" in their offici
minutes. Yet these two men, the American Kell
and the Englishman Bessemer, were the creators o
modern steel. The records of the American Paten
Office clearly show that Kelly made "Bessemer"
steel many years before Bessemer. In 1870 th
American Government refused to extend Besse
mer's patent in this country on the ground tha
William Kelly had a prior claim; in spite of this
Bessemer was undoubtedly the man who developed
the mechanical details and gave the process a uni
versal standing.

Though the Bessemer process made possible th
production of steel by tons instead of by pounds, i
would never in itself have given the nation its pres
ent prëeminence in the steel industry. Iron ha
been mined in the United States for two centurie
on a small scale, the main deposits being located i
the Lake Champlain region of New York and i
western Pennsylvania. But these, and a hundre
other places located along the Atlantic coast, coul

t have produced ore in quantities sufficient to tisfy the yawning jaws of the Bessemer convert- s. As this new method poured out the liquid in ousands of tons, and as the commercial demand tended in a dozen different directions, the cry ent up from the furnaces for more ore. And gain Nature, which has favored America in so any directions, came to her assistance. Manu- cturers in the steel regions began to recall strange ories which had been floating down for many ears from the wilderness surrounding Lake Supe- or. The recollection of a famous voyage made in is region by Philo M. Everett, as far back as 1845, ow laid siege to the imagination of the new gener- ion of ironmasters. For years the Indians had ld Everett of the "mountains of iron" that lay on e Minnesota shore of Lake Superior and had de- ribed their wonders in words that finally impelled is hardy adventurer to make a voyage of explora- on. For six weeks, in company with two Indian ides, Everett had navigated a small boat along e shores of the Lake, covering a distance that ow takes only a few hours. The Indians had long garded this silent, red iron region with a super- itious reverence, and now, as the little party ap- oached, they refused to complete the journey.

"Iron Mountain!" they said, pointing northwar
along the trail — "Indian not go near; white ma
go!" The sight which presently met Everett's ey
repaid him well for his solitary tramp in the fores
He found himself face to face with a "mounta
a hundred and fifty feet high, of solid ore, whic
looked as bright as a bar of iron just broken.
Other explorations subsequently laid open th
whole of the Minnesota fields, including the Mes
ba, which developed into the world's greatest iro
range. America has other regions rich in ore, pa
ticularly in Alabama, located alongside the co
and limestone so necessary in steel production; y
it has drawn two-thirds of its whole supply fro
these Lake Superior fields. Not only the quantit
which is apparently limitless, but the quality e
plains America's leadership in steel making.

Mining in Minnesota has a character which
not duplicated elsewhere. When we think of an iro
mine, we naturally picture subterranean caver
and galleries, and strange, gnome-like creatur
prowling about with pick and shovel and drill. Bu
mining in this section is a much simpler proceed
ing. The precious mineral does not lie conceale
deep within the earth; it lies practically upon th
surface. Removing it is not a question of blastin

ith dynamite; it is merely a matter of lifting it om the surface of the earth with a huge steam hovel. "Miners" in Minnesota have none of the onventional aspects of their trade. They operate recisely as did those who dug the Panama Canal. he railroad cars run closely to the gigantic red pit. huge steam shovel opens its jaws, descends into n open amphitheater, licks up five tons at each nouthful, and, swinging sideways over the open ars, neatly deposits its booty. It is not surpris- ng that ore can be produced at lower cost in the Jnited States than even in those countries where he most wretched wages are paid. Evidently this ne iron field, to say nothing of others already vorked, gives a permanence to our steel industry.

Not only did America have the material re- ources; what is even more important, she had also he men. American industrial history presents few roups more brilliant, more resourceful, and more icturesque than that which, in the early seven- es, started to turn these Minnesota ore fields in- steel — and into gold. These men had all the ash, all the venturesomeness, all the speculative nd even the gambling instinct, needed for one of ie greatest industrial adventures in our annals. ll had sprung from the simplest and humblest

origins. They had served their business apprenticeships as grocery clerks, errand boys, telegraph messengers, and newspaper gamins. For the most part they had spent their boyhood together, had played with each other as children, had attended the same Sunday schools, had sung in the same church choirs, and, as young men, had quarreled with each other over their sweethearts. The Pittsburgh group comprised about forty men, most of whom retired as millionaires, though their names for the most part signify little to the present-day American. Kloman, Coleman, McCandless, Shinn, Stewart, Jones, Vandervoort — are all important men in the history of American steel. Thomas A. Scott and J. Edgar Thompson, men associated chiefly with the creation of the Pennsylvania Railroad, also made their contributions. But three or four men towered so preëminently above their associates that today when we think of the human agencies that constructed this mighty edifice, the names that insistently come to mind are those of Carnegie, Phipps, Frick, and Schwab.

Books have been written to discredit Carnegie's work and to picture him as the man who has stolen success from the labor of greater men. Yet Carnegie is the one member of a brilliant company who had

ıe indispensable quality of genius. He had none
f the plodding, painstaking qualities of a Rocke-
ller; he had the fire, the restlessness, the keen rel-
h for adventure, and the imagination that leaped
ır in advance of his competitors which we find
o conspicuous in the older Vanderbilt. Carnegie
ıowed these qualities from his earliest days.
riven as a child from his Scottish home by hun-
er, never having gone to school after twelve, he
ound himself, at the age of thirteen, living in a
ıiserable hut in Allegheny, earning a dollar and
wenty cents a week as bobbin-boy in a cotton mill,
hile his mother augmented the family income
y taking in washing. Half a dozen years later
homas Scott, President of the Pennsylvania Rail-
oad, made Carnegie his private secretary. How
ell the young man used his opportunities in this
ccupation appeared afterward when he turned his
ide acquaintanceship among railroad men to prac-
cal use in the steel business. It was this personal
daptability, indeed, that explains Carnegie's suc-
ss. In the narrow, methodical sense he was not
business man at all; he knew and cared nothing
r its dull routine and its labyrinthine details. As
practical steel man his position is a negligible one.
hough he was profoundly impressed by his first

sight of a Bessemer converter, he had little interest in the every-day process of making steel. He had also many personal weaknesses: his egotism was marked, he loved applause, he was always seeking opportunities for self-exploitation, and he even aspired to fame as an author and philosopher. The staid business men of Pittsburgh early regarded Carnegie with disfavor; his daring impressed them as rashness and his bold adventures as the plunging of the speculator. Yet in all its aspects Carnegie's triumph was a personal one. He was perhaps the greatest commercial traveler this country has ever known. While his more methodical associates plodded along making steel, Carnegie went out upon the highway, bringing in orders by the millions. He showed this same personal quality in the organization of his force. As a young man, entirely new to the steel industry, he selected as the first manager of his works Captain Bill Jones; his amazing judgment was justified when Jones developed into America's greatest practical genius in making steel. "Here lies the man" — Carnegie once suggested this line for his epitaph — "who knew how to get around him men who were cleverer than himself." Carnegie inspired these men with his own energy and restlessness; the spirit of the whole establishment

utomatically became that of the pushing spirit f its head. This little giant became the most re- norseless pace-maker in the steel regions. How- ver astounding might be the results obtained by he Carnegie works the captain at the head was ever satisfied. As each month's output sur- assed that which had gone before, Carnegie always ame back with the same cry of "More." "We roke all records for making steel last week!" a de- ghted superintendent once wired him and imme- iately he received his answer, "Congratulations. Why not do it every week?" This spirit explains he success of the Carnegie Company in outdis- ancing all its competitors and gaining a world- ide preëminence for the Pittsburgh district. But arnegie did not make the mistake of capitalizing ll this prosperity for himself; his real greatness as n American business man consists in the fact that e liberally shared the profits with his associates. uthless he might be in appropriating their last unce of energy, yet he rewarded the successful en with golden partnerships. Nothing delighted arnegie more than to see the man whom he had ted from a puddler's furnace develop into a illionaire.

Henry Phipps, still living at the age of seventy-

eight, was the only one of Carnegie's early asso-
ciates who remained with him to the end. Lik
many of the others, Phipps had been Carnegie'
playmate as a boy, so far as any of them, in thos
early days, had opportunity to play; like all hi
contemporaries also, Phipps had been wretchedl
poor, his earliest business opening having been a
messenger boy for a jeweler. Phipps had none o
the dash and sparkle of Carnegie. He was th
plodder, the bookkeeper, the economizer, the ma
who had an eye for microscopic details. "Wha
we most admired in young Phipps," a Pittsburg
banker once remarked, "is the way in which h
could keep a check in the air for three or fou
days." His abilities consisted mainly in keepin
the bankers complaisant, in smoothing the ruf
fled feelings of creditors, in cutting out unneces
sary expenditures, and in shaving prices.

Carnegie's other two more celebrated associates
Henry C. Frick and Charles M. Schwab, wer
younger men. Frick was cold and masterful, a
hard, unyielding, and effective as the steel tha
formed the staple of his existence. Schwab wa
enthusiastic, warm-hearted, and happy-go-lucky
a man who ruled his employees and obtained hi
results by appealing to their sympathies. The me

f the steel yards feared Frick as much as they ɔved "Charlie" Schwab. The earliest glimpses hich we get of these remarkable men suggest cer- ain permanent characteristics: Frick is pictured s the sober, industrious bookkeeper in his grand- ather's distillery; Schwab as the rollicking, whis- ing driver of a stage between Loretto and Cres- on. Frick came into the steel business as a mat- er of deliberate choice, whereas Schwab became ssociated with the Pittsburgh group more or less y accident.

The region of Connellsville contains almost 150 quare miles underlaid with coal that has a par- cular heat value when submitted to the process nown as coking. As early as the late eighties cer- in operators had discovered this fact and were oking this coal on a small scale. It is the highest ibute to Frick's intelligence that he alone fore- w the part which this Connellsville coal was to ay in building up the Pittsburgh steel district. ne panic of 1873, which laid low most of the onnellsville operators, proved Frick's opportun- y. Though he was only twenty-four years old he cceeded, by his intelligence and earnestness, in rrowing money to purchase certain Connellsville nes, then much depreciated in price. From that

moment, coke became Frick's obsession, as stee had been Carnegie's. With his early profits he pur chased more coal lands until, by 1889, he owned ten thousand coke ovens and was the undisputed "coke king" of Connellsville. Several years before this Carnegie had made Frick one of his marshals, coke having become indispensable to the manufacture o steel, and in 1889 the former distiller's accountan became Carnegie's commander-in-chief. Probably the popular mind associates Frick chiefly with th importation of Slavs as workmen, with the terribl strikes that followed in consequence at Homestead with the murderous attack made upon him by Berkman, the anarchist, and with his bitter, long drawn-out quarrel with Andrew Carnegie. Frick's stormy career was naturally the product of hi character.

On the other hand, temperamental pliability and lovableness were the directing traits of th man who, in his way, made contributions quite a solid to the extension of the Pittsburgh steel in dustry. Schwab worked with the human materia quite as successfully as other men worked wit iron ore, Bessemer furnaces, and coal. He handle successfully what was perhaps the greatest tas in management ever presented to a manufacture

en to him fell the job of reorganizing the Home-ad Works after the strike of 1892 and of trans-ming thousands of riotous workmen into orderly d interested producers of steel. In three or four ars practically every man on the premises had be-me "Charlie" Schwab's personal friend, and the omestead property which, until the day he took arge, had been a colossal failure, had developed o one of the most profitable holdings of the rnegie Company. As his reward Schwab, at e age of thirty-four, was made President of the rnegie corporation. Only sixteen years before had entered the steel works as a stake driver a dollar a day.

When the Carnegie group began operations in e early seventies, American steel, as a British iter remarked, was a "hot-house product"; yet 1900 the Carnegie partners divided $40,000,000 the profits of a single year. They had demon-ated that the United States, despite the high ices that prevailed everywhere, could make steel ore cheaply than any other country. Foreign ob-vers have offered several explanations for this hievement. American makers had an endless pply of cheap and high-grade ore, cheaper coke, eaper transportation, and workmen of a superior

skill. We must give due consideration to the fac that their organization was more flexible than thos of older countries, and that it regulated promotio exclusively by merit and gave exceptional oppo tunities to young men. American steel makers als had scrap heaps whose size astounded the foreig observers; they never hesitated to discard the mos expensive plants if by so doing they could reduc the cost of steel rails by a dollar a ton. Machiner for steel making had a more extensive developmen in this country than in England or Germany. M Carnegie also enjoyed the advantages of a high pro tective tariff, though about 1900 he discovered tha his extremely healthy infant no longer demande this form of coddling. But probably the Carnegi Company's greatest achievement was the abolitio of the middleman. In a few years it assembled a the essential elements of steel making in its ow hands. Frick's entrance into the combination gav the concern an unlimited supply of the highes grade of coking coal. In a few years, the Carnegi interests had acquired great holdings in the Minne sota ore regions.

At first glance, the Pittsburgh region seem hardly the ideal place for the making of steel. For tune first placed the industry there because all th

w materials, especially iron ore and coal, seemed exist in abundance. But the discovery of the innesota ore field, which alone could supply this sential product in the amounts which the furces demanded, immediately deprived the Pittsrgh region of its chief advantage. As a result this sudden development, the manufacturers of ttsburgh awoke one morning and discovered that eir ore was located a thousand miles away. To ing it to their converters necessitated a long oyage by water and rail, with several reloadings. hey overcame these obstacles by developing mainery for handling ore and by acquiring the raw aterials and the connecting links of transportaon. Ore which had been lying in the wilds of innesota on Monday morning was thus brought Pittsburgh and made into steel rails or bridges structural shapes by Saturday night. The Caregie Company first acquired sufficient mineral nds to furnish ore for several generations and ornized an ore fleet which transported the products the mines through the lakes to ports on Lake ie, particularly Ashtabula and Conneaut. The rchase of the Bessemer and Lake Erie Railroad, hich extended from Conneaut to Pittsburgh, made is great transportation route complete. Besides

freeing their business from uncertainty, this elim
nation of middlemen naturally produced grea
economies.

Probably Andrew Carnegie's shrewdness in nam
ing his first plant the J. Edgar Thompson Ste
Works, after the powerful President of the Penn
sylvania Railroad, and in making Thompson an
his associate Scott partners, had much to do wit
his early success. These two gentlemen conferre
two priceless favors upon the struggling enterpris
They became large purchasers of steel rails an
their influence in this direction extended far be
yond the Pennsylvania Railroad. What was pe
haps even more important, they gave the Carneg
concerns railroad rebates. The use of rebates, a
a method of stifling competition and building up
great industrial prosperity, is an offense which th
popular mind associates almost exclusively wit
the Standard Oil Company, yet the Carnegie fo
tune, as well as that of John D. Rockefeller, re
ceived an artificial stimulation of this kind.

Though incomparably the greatest of the Amer
ican steel companies, the Carnegie Steel Compan
by no means monopolized the field. In forty years
indeed, an enormous steel area had grown up, in
cluding western Pennsylvania, Ohio, Indiana, an

inois, practically all of it drawing its raw mate-
ls from those same teeming ore lands in the Lake
perior region. Johnstown, Youngstown, Cleve-
nd, Lorain, Chicago, and Joliet, became head-
arters of steel production almost as important as
ttsburgh itself. Two entirely new steel kingdoms,
ch with its own natural reservoirs of ore, grew up
Colorado and Alabama. The Colorado Fuel and
on Company, which possessed apparently inex-
ustible mineral lands in Colorado, Wyoming,
tah, New Mexico, and California, itself produces
t far from three million tons a year, almost half
e present production of Great Britain. The Ala-
ma steel country has developed in even more
ectacular fashion. Birmingham, a hive of south-
n industry placed almost as if by magic in the lei-
rely cotton lands of the South, had no existence
1870, when the Pittsburgh prosperity began.
the Civil War, the present site of a city with
population of 140,000 was merely a blacksmith
op in the fork of the roads. Yet this district has
vantages for the manufacture of steel that have
parallel elsewhere. The steel companies which
e located here do not have to bring their ma-
ials laboriously from a distance but possess, im-
diately at hand, apparently endless store of the

three things needful for making steel — iron or coal, and limestone. All these territories have the personal romances and their heroes, many of the quite as picturesque as those of the Pittsburg group.

It is doubtful indeed if American industry pr sents any figure quite as astonishing and variegate as that of John W. Gates, the man who educate farmers all over the world to the use of wire fencin Half charlatan, half enthusiast, speculator, gam bler, a man who created great enterprises and wh also destroyed them, at times an up-building for and at other times a sinister influence, Gates com pletely typified a period in American history tha along with much that was heroic and splendid, ha much also that was grotesque and sordid. Th opera-bouffe performance that laid the foundatio of Gates's great industry was in every way chara teristic of this period. In 1871 Gates, then a cle in a hardware store at twenty-five dollars a wee made his first attempt to sell barbed wire in t great cattle countries of the southwestern State When the cattle men in Texas first saw this barb wire, they ridiculed the idea that it could ever ho their steers. Gates selected a plaza in San Antoni fenced it in with his new product, and invited t

emies to bring along their wildest specimens. bout thirty of Texas' most ferocious cattle, placed thin the enclosure, spent a whole afternoon inging at the barbs in a useless and tormenting tempt to escape. This spectacular demonstra-on of efficiency launched Gates fairly upon his reer. He immediately began to sell his new fenc-g on an enormous scale; in a few years the whole orld was demanding it, and it has become, as re-nt events have disclosed, a particularly formid-le munition of war. The American Steel and ire Company, one of the greatest of American rporations, was the ultimate outgrowth of that ely afternoon in San Antonio.

In 1900 the Carnegie Steel Company was making ne-quarter of all the Bessemer steel produced in ne United States. It owned in abundance all the roperties which were essential to its completed utput — coal, limestone, steel ships, railroads, and eel mills. In twenty-five years, from 1875 to 900, this manufacturing enterprise had paid the arnegie group profits aggregating $133,000,000, rofits which, in the closing years of the century, ad increased at a stupendous rate. In 1898 Car-egie and his associates had divided $11,500,000, 1899 their earnings had grown to $25,000,000, and

in 1900 the aggregate had suddenly jumped to $40
000,000. Of this latter sum Carnegie received $25
000,000, Phipps $5,500,000, Frick $2,600,000, an
Schwab $1,300,000. And Carnegie's little grou
could see no limit to the growth of their busine
and the expansion of their personal fortunes. Ye
at that very moment Carnegie was planning t
play the part of a Charles V. with the large em
pire which he had pieced together — to abdica
his throne, retire from business life, and spend h
remaining days in quiet.

Many influences were impelling him to this de
cision. His triumph, stupendous as it had beer
also had had its alloy of sorrow. Indeed this litt
Scotsman, now at the crowning of his glory, wa
one of the loneliest figures in the world. Pract
cally all the forty men with whom he had bee
closely associated had vanished from the scen
He had quarreled with his playmate and lifelon
partner, Henry Phipps, and was in the worst po
sible business and personal relations with Fric
He had no son to carry on his work. He had b
come greatly interested in his philanthropies, an
he had declared that the man who died rich die
disgraced. Moreover, new influences were risin
in the steel trade with which Carnegie had litt

ympathy. Its national capital seemed to be shifting from Pittsburgh to Wall Street. New men who knew nothing about steel but who possessed an intimate acquaintance with stocks and bonds — J. Pierpont Morgan, George W. Perkins, and their associates — were branching out as controllers of large steel interests. Carnegie had no interest in Wall Street; he has declared that he never speculated in his life and that he would immediately dissociate himself from any partner who would do so. This Wall Street coterie, in the years from 1898 to 1900, had made several large combinations in the steel trade. That was the era when the trust mania had gained possession of the American mind and when its worst features displayed themselves. The Federal Steel Company, the American Bridge Company, the American Steel and Wire, the National Tube Company, all representing the assembling of large works which had been engaged as rivals in similar enterprises, were launched, with the usual accompaniments of "underwriting syndicates," watered stock, and Wall Street speculation. This sort of thing made no appeal to Andrew Carnegie. His huge enterprise had always remained essentially a copartnership, and he had frequently expressed his abhorrence of trusts.

Yet, in spite of his wish to retire from business and in spite of his avowed intention to die poor, Carnegie now adopted the policy of the Sibylline leaves to all prospective purchasers. Moore and Reid would have purchased his interest for $157,000,000; when Rockefeller came along the price had risen to $250,000,000; when the oil man shook his head and retired, Carnegie immediately raised his price to $500,000,000. It is doubtful whether he would have sold at all had not his Wall Street competitors begun to encroach on a field which the little Scotsman understood quite as well as they — the production and merchandising of steel. The newly organized combinations were completing elaborate plans to go after Carnegie's business. Then Carnegie, who had practically retired from active life, again arrayed himself in his shirt-sleeves, abandoned his career of authorship, and resumed his early trade. His first attacks produced an immense reverberation in the House of Morgan. He purchased a huge tract at Conneaut and began building a gigantic plant for the manufacture of steel tubes, a business in which he had not hitherto engaged. This was a blow aimed at one of Morgan's pet new creations, the National Tube Company. Should Carnegie finish his works, there

as no doubt the Morgan enterprise would be ained, for the new plant would be far more modern nd so could manufacture the product at a much ower price; and, with Charles M. Schwab as active anager, what possible chance would the older corporation have? But Carnegie struck his enemy at n even more vulnerable point. The Pennsylvania Railroad had a practical monopoly of traffic in and ut of Pittsburgh, and Pittsburgh "created" more reight business than any other city in the world. Carnegie lent his powerful support to George J. Gould, who was then extending his railroad system nto the preëmpted field and was also making urveys and had financed a company to build an ntirely new railroad from Pittsburgh to the Atantic Coast. As Carnegie himself controlled the arger part of the freight that made Pittsburgh such n essential feeder to railroads, his new enterprise aused the greatest alarm. At the same time Caregie equipped a new and splendid fleet of ore ips, his purpose being to enter a field of transporation which John D. Rockefeller had found exremely profitable.

Such were the circumstances and such were the otives that gave birth to the world's largest corporation. All one night, so the story goes, Charles

M. Schwab and John W. Gates discussed the steel situation with J. Pierpont Morgan. There was only one possible solution, they said — Andrew Carnegie must be bought out. By the time the morning sun came through the windows Morgan had been convinced. "Go and ask him what he will sell for," he said to Schwab. In a brief period Schwab came back to Morgan with a letter which contained the following figures — five per cent gold bonds $303,450,000; preferred stock $98,277,100; common stock $90,279,000 — a total of over $492,000,000. Carnegie demanded no cash; he preferred to hold a huge first mortgage on a business whose golden opportunities he knew so well. Morgan, who had been accustomed all his life to dictate to other men, had now met a man who was able to dictate to him. And he capitulated. The man who fifty-three years before had started life in a new country as a bobbin-boy at a dollar and twenty cents a week, now at the age of sixty-six retired from business the second richest man in the world. With him retired a miscellaneous assortment of millionaires whose fortunes he had made and whose subsequent careers in the United States and in Europe have given a peculiar significance to the name "Pittsburgh Millionaires." The United

tates Steel Corporation, the combination that in-
uded not only the Carnegie Company but seventy
er cent of all the steel concerns in the country,
as really a trust made up of trusts. It had a
apitalization of a billion and a half, of which
bout $700,000,000 was composed of the commodity
sually known as "water"; but so greatly has its
usiness grown and so capably has it been managed
hat all this liquid material has since been con-
erted into more solid substance. The disappear-
nce of Andrew Carnegie and his coworkers and
he emergence of this gigantic enterprise completed
he great business cycle in the steel trade. The
ge of individual enterprise and competition had
assed — that of corporate control had arrived.

CHAPTER IV

THE TELEPHONE: "AMERICA'S MOST POETICAL ACHIEVEMENT"

A DISTINGUISHED English journalist, who was visiting the United States, in 1917, on an important governmental mission, had an almost sublime illustration of the extent to which the telephone had developed on the North American Continent. Sitting at a desk in a large office building in New York Lord Northcliffe took up two telephone receivers and placed one at each ear. In the first he heard the surf beating at Coney Island, New York, and in the other he heard, with equal distinctness, the breakers pounding the beach at the Golden Gate, San Francisco. Certainly this demonstration justified the statement made a few years before by another English traveler. "What startles and frightens the backward European in the United States," said Mr. Arnold Bennett, "is the efficiency and fearful universality of the telephone

o me it was the proudest achievement and
ie most poetical achievement of the American
eople."

Lord Northcliffe's experience had a certain
ramatic justice which probably even he did not
ppreciate. He is the proprietor of the London
imes, a newspaper which, when the telephone was
rst introduced, denounced it as the "latest Amer-
an humbug" and declared that it "was far in-
rior to the well-established system of speaking
ibes." The London *Times* delivered this solemn
idgment in 1877. A year before, at the Phila-
elphia Centennial Exposition, Don Pedro, Em-
eror of Brazil, picked up, almost accidentally, a
ieer cone-shaped instrument and put it to his ear.
My God! It talks!" was his exclamation; an
cident which, when widely published in the press,
rst informed the American people that another
the greatest inventions of all times had had its
rth on their own soil. Yet the initial judgment
the American people did not differ essentially
om the opinion which had been more coarsely
pressed by the leading English newspaper. Our
thers did not denounce the telephone as an
American humbug," but they did describe it as a
rious electric "toy" and ridiculed the notion that

it could ever have any practical value. Even after Alexander Graham Bell and his associates had completely demonstrated its usefulness, the Western Union Telegraph Company refused to purchase all their patent rights for $100,000! Only forty years have passed since the telephone made such an inauspicious beginning. It remains now, as it was then, essentially an American achievement. Other nations have their telephone systems, but it is only in the United States that its possibilities have been even faintly realized. It is not until Americans visit foreign countries that they understand that imperfect as in certain directions their industrial and social organization may be, in this respect at least their nation is preëminent.

The United States contains nearly all the telephones in existence, to be exact, about seventy-five per cent. We have about ten million telephones while Canada, Central America, South America, Great Britain, Europe, Asia, and Africa all combined have only about four million. In order to make an impressive showing, however, we need not include the backward peoples, for a comparison with the most enlightened nations emphasizes the same point. Thus New York City has more telephones than six European countries taken together

Austria-Hungary, Belgium, Norway, Denmark, ıly, and the Netherlands. Chicago, with a pop- ıtion of 2,000,000, has more telephones than e whole of France, with a population of 40,000,- 0. Philadelphia, with 1,500,000, has more than e Russian Empire, with 166,000,000. Boston has ore telephones than Austria-Hungary, Los An- les more than the Netherlands, and Kansas City ore than Belgium. Several office buildings and tels in New York City have more instruments an the kingdoms of Greece or Bulgaria. The ıole of Great Britain and Ireland has about 0,000 telephones, which is only about 200,000 ore than the city of New York.

Mere numbers, however, tell only half the story. is when we compare service that American periority stands most manifest. The London wspapers are constantly filled with letters abus- the English telephone system. If these com- ınications describe things accurately, there is parently no telephone vexation that the Eng- ınman does not have to endure. Delays in tting connections are apparently chronic. At ıes it seems impossible to get connections at , especially from four to five in the afternoon when the operators are taking tea. Suburban

connections, which in New York take about ninet seconds, average half an hour in London, and man of the smaller cities have no night service. A American thinks nothing of putting in a telephon he notifies his company and in a few days the in strument is installed. We take a thing like th for granted. But there are places where a mer telephone subscription, the privilege of having a instrument installed, is a property right of con siderable value and where the telephone servic has a "waiting list," like an exclusive club. I Japan one can sell a telephone privilege at a goo price, its value being daily quoted on the Stoc Exchange. Americans, by constantly using th telephone, have developed what may be called sixth sense, which enables them to project the personalities over an almost unlimited area. I the United States the telephone has become the on all-prevailing method of communication. Th European writes or telegraphs while the America more frequently telephones. In this country th telephone penetrates to places which even the mai never reach. The rural free delivery and othe forms of the mail service extend to 58,000 com munities, while our 10,000,000 telephones encom pass 70,000. We use this instrument for all th

ried experiences of life, domestic, social, and mmercial. There are residences in New York ty that have private branch exchanges, like a nk or a newspaper office. Hostesses are more and ore falling into the habit of telephoning invitaons for dinner and other diversions. Many people id telephone conversations more convenient than rsonal interviews, and it is every day displacing e stenographer and the traveling salesman.

Perhaps the most noteworthy achievement of the lephone is its transformation of country life. In urope, rural telephones are almost unknown, hile in the United States one-third of all our telehone stations are in country districts. The farmer o longer depends upon the mails; like the city an, he telephones. This instrument is thus the eatest civilizing force we have, for civilization very largely a matter of intercommunication. ndeed, the telephone and other similar agencies, ch as the parcel post, the rural free delivery, tter roads, and the automobile, are rapidly transrming rural life in this country. In several reons, especially in the Mississippi Valley, a farmer ho has no telephone is in a class by himself, ke one who has no mowing-machine. Thus the test returns from Iowa, taken by the census as

far back as 1907, showed that seventy-three p
cent of all the farms — 160,000 out of 220,000
had telephones and the proportion is unquestio
ably greater now. Every other farmhouse fr
the Atlantic to the Pacific contains at least o
instrument. These statistics clearly show that t
telephone has removed half the terrors and iso
tion of rural life. Many a lonely farmer's wife
daughter, on the approach of a suspicious-looki
character, has rushed to the telephone and call
up the neighbors, so that now tramps notorious
avoid houses that shelter the protecting wires.
remote sections, insanity, especially among wome
is frequently the result of loneliness, a calami
which the telephone is doing much to mitigate.

In the United States today there is one telepho
to every nine persons. This achievement rep
sents American invention, genius, industrial orga
ization, and business enterprise at their best. T
story of American business contains many cha
ters and episodes which Americans would willing
forget. But the American Telephone and Te
graph Company represents an industry which h
made not a single "swollen fortune," whose larg
stockholder is the wife of Alexander Graham Be
the inventor (a woman who, being totally de

s never talked over the telephone); which has
t corrupted legislatures or courts; which has
eadily decreased the prices of its products as
siness and profits have increased; which has
ver issued watered stock or declared fictitious
vidends; and which has always manifested a high
nse of responsibility in its dealings with the
blic.

Two forces, American science and American
siness capacity, have accomplished this result.
s a mechanism, this American telephone system
the product not of one but of many minds. What
ost strikes the imagination is the story of Alex-
nder Graham Bell, yet other names — Carty,
ribner, Pupin — play a large part in the story.
The man who discovered that an electric current
d the power of transmitting sound over a copper
ire knew very little about electricity. Had he
nown more about this agency and less about
oustics, Bell once said himself, he would never
ve invented the telephone. His father and
andfather had been teachers of the deaf and
mb and had made important researches in acous-
cs. Alexander Graham Bell, born in Edinburgh
March, 1847, and educated there and in London,
llowed the ancestral example. This experience

gave Bell an expert knowledge of phonetics tha
laid the foundation for his life work. His inve
tion, indeed, is clearly associated with his attemp
to make the deaf and dumb talk. He was drive
to America by ill-health, coming first to Canad
and in 1871 he settled in Boston, where he accepte
a position in Boston University to introduce h
system of teaching deaf-mutes. He opened
school of "Vocal Physiology," and his success i
his chosen field brought him into association wit
the people who afterward played an important pa
in the development of the telephone. Not a sing
element of romance was lacking in Bell's exper
ence; his great invention even involved the lov
story of his life. Two influential citizens of Bosto
Thomas Sanders and Gardiner G. Hubbard, ha
daughters who were deaf and dumb, and bot
engaged Bell's services as teacher. Bell lived i
Sanders's home for a considerable period, dividin
his time between teaching his little pupil how t
talk and puttering away at a proposed inventio
which he called a "harmonic telegraph." Bot
Sanders and Hubbard had become greatly inte
ested in this contrivance and backed Bell finan
cially while he worked. It was Bell's idea that, b
a system of tuning different telegraphic receive

different pitches, several telegraphic messages ould be sent simultaneously over the same wire. he idea was not original with Bell, although he pposed that it was and was entirely unaware at, at the particular moment when he started ork, about twenty other inventors were strug- ing with the same problem. It was one of these her twenty experimenters, Elisha Gray, who ulti- ately perfected this instrument. Bell's researches ave an interest only in that they taught him much bout sound transmission and other kindred sub- cts and so paved the way for his great conception.

One day Hubbard and Sanders learned that ell had abandoned his "harmonic telegraph" and as experimenting with an entirely new idea. This as the possibility of transmitting the human voice ver an electric wire. While working in Sanders's asement, Bell had obtained from a doctor a dead an's ear, and it is said that while he was minutely udying and analyzing this gruesome object, the ea of the telephone first burst upon his mind. or years Bell had been engaged in a task that emed hopeless to most men — that of making eaf-mutes talk. "If I can make a deaf-mute talk, can make iron talk," he declared. "If I could ake a current of electricity vary in intensity as

the air varies in density," he said at another time "I could transmit sound telegraphically." Many others, of course, had dreamed of inventing such an instrument. The story of the telephone concerns many men who preceded Bell, one of whom Philip Reis, produced, in 1861, a mechanism that could send a few discordant sounds, though not the human voice, over an electric wire. Reis seemed to have based his work upon an article published in *The American Journal of Science* by Dr. C. G. Page of Salem, Mass., in 1837, in which he called attention to the sound given out by an electric magnet when the circuit is opened or closed. The work of these experimenters involves too many technicalities for discussion in this place. The important facts are that they all involved different principles from those worked out by Bell and that none of them ever attained any practical importance. Reis, in particular, never grasped the essential principles that ultimately made the telephone a reality. His work occupies a place in telephone history only because certain financial interests, many years after his death, brought it to light in an attempt to discredit Bell's claim to priority as the inventor. An investigator who seems to have grasped more clearly the basic idea was the distinguished

American inventor Elisha Gray, already mentioned as the man who had succeeded in perfecting the "harmonic telegraph." On February 14, 1876, Gray filed a caveat in the United States Patent Office, setting forth pretty accurately the conception of the electric telephone. The tragedy in Gray's work consists in the fact that, two hours before his caveat had been put in, Bell had filed his application for a patent on the completed instrument.

The champions of Bell and Gray may dispute the question of priority to their heart's content; the historic fact is that the telephone dates from a dramatic moment in the year 1876. Sanders and Hubbard, much annoyed that Bell had abandoned his harmonic telegraph for so visionary an idea as a long distance talking machine, refused to finance him further unless he returned to his original quest. Disappointed and disconsolate, Bell and his assistant, Thomas A. Watson, had started work on the top floor of the Williams Manufacturing Company's shop in Boston. And now another chance happening turned Bell back once more to the telephone. His magnetized telegraph wire stretched from one room to another located in a remote part of the building. One day Watson accidentally plucked a

piece of clock wire that lay near this telegraph wire and Bell, working in another room, heard the twang. A few seconds later Watson was startled when an excited and somewhat disheveled figure burst into his room. "What was that?" shouted Bell. What had happened was clearly manifest; a sound had been sent distinctly over an electric wire. Bell's harmonic telegraph immediately went into the discard, and the young inventor — Bell was then only twenty-nine — became a man of one passionate idea. Yet final success did not come easily; the inventor worked day and night for forty weeks before he had obtained satisfactory results. It was on March 10, 1876, that Watson, in a distant room, picked up the first telephone receiver and heard these words, the first that had ever passed over a magnetized wire, "Come here, Watson; I want you." The speaking instrument had become a reality, and the foundation of the telephone, in all its present development, had been laid. When the New York and San Francisco line was opened in January, 1915, Alexander Graham Bell spoke these same words to his old associate, Thomas Watson, located in San Francisco, both men using the same instruments that had served so well on that historic occasion forty years before.

Though Bell's first invention comprehended the great basic idea that made it a success, the instrument itself bore few external resemblances to that which has become so commonplace today. If one could transport himself back to this early period and undergo the torture of using this primitive telephone, he would appreciate somewhat the labor, the patience, the inventive skill, and the business organization that have produced the modern telephone. In the first place you would have no separate transmitter and receiver. You would talk into a funnel-shaped contrivance and then place it against your ear to get the returning message. In order to make yourself heard, you would have to shout like a Gloucester sea-captain at the height of a storm. More than the speakers' voices would come over the wire. It seemed to have become the playground of a million devils; moanings, shriekings, mutterings, and noises of all kinds would constantly interrupt the flow of speech. To call up your "party" you would not merely lift the receiver as today; you would tap with a lead pencil, or some other appliance, upon the diaphragm of your transmitter. There were no separate telephone wires. The talking at first was done over the telegraph lines. The earliest "centrals"

reminded most persons of madhouses, for the day of the polite, soft-spoken telephone girl had not arrived. Instead, boys were rushing around with the ends of wires which they were frantically attempting to peg into the holes of the primitive switchboard and so establish "connections." When not knocking down and fighting each other, these boys were swearing into transmitters at the customers; and it is said that the incurable profanity of these early "telephone boys" had much to do with their supersession by girls. In the early days of the telephone, each instrument had to carry its own battery, usually installed in a little box under the transmitter. The early telephone wires, even in the largest cities, were strung on poles, as they are in country and suburban districts today. In places like New York and Chicago, these thousands of overhanging wires not only destroyed the attractiveness of the thoroughfare, but constantly interfered with the fire department and proved to be public nuisances in other ways. A telephone wire, however, loses much of its transmitting power when placed under ground, and it took many years of experimenting before the engineers perfected these subways. In these early days, of course, the telephone was purely a local matter. Certain visionary

nthusiasts had foreseen the possibility of a na-
ional, long distance system, but a large amount
f labor, both in the laboratory and out, was to be
xpended before these aspirations could become
ealities.

The transformation of this rudimentary means
f communication into the beautiful mechanism
vhich we have today forms a splendid chapter in
he history of American invention. Of all the de-
ails in Bell's apparatus the receiver is almost the
nly one that remains now what it was forty years
go. The story of the transmitter in itself would
ll a volume. Edison's success in devising a trans-
nitter which permitted talk in ordinary conver-
ational tones — an invention that became the
roperty of the Western Union Telegraph Com-
any, which early embarked in the telephone busi-
ess — at one time seemed likely to force the Bell
ompany out of business. But Emile Berliner and
rancis Blake finally came to the rescue with an
xcellent instrument, and the suggestion of an
nglish clergyman, the Reverend Henry Hum-
hings, that carbon granules be used on the dia-
hragm, made possible the present perfect instru-
ient. The magneto call bell — still used in cer-
ain backward districts — for many years gave fair

results for calling purposes, but the automati
switch, which enables us to get central by merel
picking up the receiver, has made possible our grea
urban service. It was several years before th
telephone makers developed so essential a thing a
a satisfactory wire. Silver, which gave excellen
results, was obviously too costly, and copper, th
other metal which had many desirable qualities
was too soft. Thomas B. Doolittle solved thi
problem by inventing a hard-drawn copper wire
A young man of twenty-two, John J. Carty
suggested a simple device for exorcising the hun
dreds of "mysterious noises" that had made th
use of the telephone so agonizing. It was caused
Carty pointed out, by the circumstance that th
telephone, like the telegraph, used a ground circui
for the return wire; the resultant scrapings an
moanings and howlings were merely the multitu
dinous voices of mother earth herself. Mr. Cart
began installing the metallic circuit in his lines –
that is, he used wire, instead of the ground, t
complete the circuit. As a result of this improve
ment the telephone was immediately cleared o
these annoying interruptions. Mr. Carty, who i
now Chief Engineer of the American Telephone an
Telegraph Company, and the man who has super

ntended all its extensions in recent years, is one of he three or four men who have done most to create he present system. Another is Charles E. Scribner, ho, by his invention of that intricate device, the ultiple switchboard, has converted the telephone xchange into a smoothly working, orderly place. cribner's multiple switchboard dates from about 890. It was Mr. Scribner also who replaced he individual system of dry cells with one com- on battery located at the central exchange, an nprovement which saved the Company 4,000,- 00 dry cells a year. Then Barrett discovered a ethod of twisting fifty pairs of wires — since rown to 2400 pairs — into a cable, wrapping them paper and molding them in lead, and the wires ere now taken from poles and placed in conduits nderground.

But perhaps the most romantic figure in tele- hone history, next to Bell, is that of a humble Ser- ian immigrant who came to this country as a boy nd obtained his first employment as a rubber in Turkish bath. Michael I. Pupin was graduated om Columbia, studied afterward in Germany, and ecame absorbed in the new subject of electro- echanics. In particular he became interested in telephone problem that had bothered the greatest

experts for years. One thing that had prevented the great extension of the telephone, especially for long distance work, was the size of the wire. Long distance lines up to 1900 demanded wire about one-eighth of an inch thick — as thick as a fair sized lead pencil; and, for this reason, the New York–Chicago line, built in 1893, consumed 870,000 pounds of copper wire of this size. Naturally the enormous expense stood in the way of any extended development. The same thickness also interfered with cable extension. Only about a hundred wires could be squeezed into one cable, against the eight een hundred now compressed in the same area. Because of these shortcomings, telephone progress about 1900, was marking time, awaiting the arrival of a thin wire that would do the work of a thick one. The importance of the problem is shown by the fact that one-fourth of all the capital invested in the telephone has been spent in copper. Professor Pupin, who had been a member of the faculty of Columbia University since 1888, solved this problem in his quiet laboratory and, by doing so, won the greatest prize in modern telephone art. His researches resulted in the famous "Pupin coil" by the expedient now known as "loading." When the scientists attempt to explain this invention

ney have to use all kinds of mathematical formulas nd curves and, in fact, they usually get to quarrel- ng among themselves over the points involved. What Professor Pupin has apparently done is to ree the wire from those miscellaneous disturbances nown as "induction." This Pupin invention in- olved another improvement unsuspected by the nventor, which shows us the telephone in all its hystery and beauty and even its sublimity. Soon fter the Pupin coil was introduced, it was discov- red that, by crossing the wires of two circuits at egular intervals, another unexplainable circuit vas induced. Because this third circuit travels pparently without wires, in some manner which he scientists have not yet discovered, it is appro- riately known as the phantom circuit. The prac- ical result is that it is now possible to send three elephone messages and eight telegraph messages ver two pairs of wires — all at the same time. Professor Pupin's invention has resulted in econo- nies that amount to millions of dollars, and has nade possible long distance lines to practically very part of the United States.

Thus many great inventive minds have produced he physical telephone. We can point to several nen — Bell, Blake, Carty, Scribner, Barrett, Pupin

— and say of each one, "Without his work th present telephone system could not exist." Bu business genius, as well as mechanical genius, ex plains this achievement. For the first four or fiv years of its existence, the new invention had har sailing. Bell and Thomas Watson, in order to for tify their finances, were forced to travel aroun the country, giving a kind of vaudeville entertain ment. Bell made a speech explaining the new in vention, while a cornet player, located in anothe part of the town, played solos, the music reach ing the audience through several telephone in struments placed against the walls. Watson, als located at a distance, varied the program by sing ing songs via telephone. These lecture tours no only gave Bell the money which he sorely neede but advertised the innovation. There followed few scattering attempts to introduce the telephon into every-day use and telephone exchanges wer established in New York, Boston, Bridgeport, an New Haven. But these pioneers had the hostilit of the most powerful corporation of the day — th Western Union Telegraph Company — and the lacked aggressive leaders.

In 1878, Mr. Gardiner Hubbard, Bell's earl est backer, and now his father-in-law, becam

cquainted with a young man who was then serv-ng in Washington as General Superintendent of he Railway Mail Service. This young man was Theodore N. Vail. His energy and enterprise so mpressed Hubbard that he immediately asked Vail to become General Manager of the company which he was then forming to exploit the telephone. Viewed from the retrospection of forty years this offer certainly looks like one of the greatest prizes n American business. What it signified at that ime, however, is apparent from the fact that the office paid a salary of $3500 a year and that for the irst ten years Vail did not succeed in collecting a dollar of this princely remuneration. Yet it was a happy fortune, not only for the Bell Company but or the nation, that placed Vail at the head of this struggling enterprise. There was a certain appro-priateness in his selection, even then. His grand-uncle, Stephen Vail, had built the engines for the irst steamship to cross the Atlantic. A cousin had worked with Morse while he was inventing the tele-graph. Vail, who was born in Carroll County, Ohio, n 1845, after spending two years as a medical stu-dent, suddenly shifted his plans and became a tele-graph operator. Then he entered the Railway Mail service; in this service he completely revolutionized

the system and introduced reforms that exist a
the present time. A natural bent had apparentl
directed Vail's mind towards methods of com
munication, a fact that may perhaps explain th
youthful enthusiasm with which he took up th
new venture and the vision with which he foresa
and planned its future. For the chief fact abou
Vail is that he was a business man with an imagi
nation. The crazy little machine which he no
undertook to exploit did not interest him as
means of collecting tolls, floating stock, and payin
dividends. He saw in it a new method of spread
ing American civilization and of contributing t
the happiness and comfort of millions of people
Indeed Vail had hardly seen the telephone when
picture portraying the development which we ar
familiar with today unfolded before his eyes. Tha
the telephone has had a greater development i
America than elsewhere and that the United State
has avoided all those mistakes of organization tha
have so greatly hampered its growth in other lands
is owing to the fact that Vail, when he first too
charge, mapped out the comprehensive policie
which have guided his corporation since.

Vail early adopted the "slogan" which has di
rected the Bell activities for forty years — "On

ystem! One Policy! Universal Service." In his
ind a telephone company was not a city affair,
r even a state affair; it was a national affair. His
im has been from the first a universal, national
ervice, all under one head, and reaching every
amlet, every business house, factory, and home
n the nation. The idea that any man, anywhere,
hould be able to take down a receiver and talk to
ny one, anywhere else in the United States, was the
onception which guided Vail's labors from the first.
Ie did not believe that a mass of unrelated com-
anies could give a satisfactory service; if circum-
tances had ever made a national monopoly, that
ionopoly was certainly the telephone. Having in
iew this national, universal, articulating monop-
ly, Vail insisted on his second great principle,
ie standardization of equipment. Every man's
elephone must be precisely like every other man's,
nd that must be the best which mechanical skill
nd inventive genius could produce. To make this
reality and to secure perfect supervision and up-
eep, it was necessary that telephones should not
e sold but leased. By enforcing these ideas Vail
ved the United States from the chaos which ex-
ts in certain other countries, such as France, where
ch subscriber purchases his own instrument,

making his selection from about forty differen
varieties. That certain dangers were inherent i
this universal system Vail understood. Monop
oly all too likely brings in excessive charges, poo
service, and inside speculation; but it was Vail'
plan to justify his system by its works. To thi
end he established a great engineering departmen
which should study all imaginable mechanical im
provements, with the results which have been de
scribed. He gave the greatest attention to ever
detail of the service and particularly insisted on th
fairest and most courteous treatment of the public
The "please" which invariably accompanies th
telephone girl's request for a number — the fa
miliar "number, please" — is a trifle, but it epito
mizes the whole spirit which Vail inspired through
out his entire organization. Though there ar
plenty of people who think that the existin
telephone charges are too high, the fact remain
that the rate has steadily declined with the exten
sion of the business. Vail has also kept his com
pany clear from the financial scandals that hav
disgraced so many other great corporations. H
has never received any reward himself except hi
salary, such fortune as he possesses being the resul
of personal business ventures in South Americ

luring the twenty years from 1887 to 1907 that ie was not associated with the Bell interests.

Vail's first achievement was to rescue this in-vention from the greatest calamity which would iave befallen it. The Western Union Telegraph Company, which in the early days had looked upon he telephone as negligible, suddenly awoke one norning to a realization of its importance. This orporation had recently introduced its "printing elegraph," a device that made it possible to ommunicate without the intermediary operator. When news reached headquarters that subscribers vere dropping this new contrivance and subscrib-ng to telephones, the Western Union first un-lerstood that a competitor had entered their eld. Promptly organizing the American Speaking Telephone Company, the Western Union, with all ts wealth and prestige, proceeded to destroy this nsolent pigmy. Its methods of attack were un-crupulous and underhanded, the least discredit-ble one being the use of its political influence to revent communities from giving franchises to the Bell Company. But this corporation mainly relied or success upon the wholesale manner in which it nfringed the Bell patents. It raked together all ossible claimants to priority, from Philip Reis

to Elisha Gray, in its attempts to discredit Be
as the inventor. The Western Union had onl
one legitimate advantage — the Edison transmit
ter — which was unquestionably much superior t
anything which the Bell Company then possessed
Many Bell stockholders were discouraged in face o
this fierce opposition and wished to abandon th
fight. Not so Vail. The mere circumstance tha
the great capitalists of the Western Union ha
taken up the telephone gave the public a confidenc
in its value which otherwise it would not have had
a fact which Vail skillfully used in attracting in
fluential financial support. He boldly sued th
Western Union in 1878 for infringement of the Bel
patents. The case was a famous one; the whol
history of the telephone was reviewed from th
earliest days, and the evidence as to rival claimant
was placed on record for all time. After about
year, Mr. George Clifford, perhaps the best paten
attorney of the day, who was conducting the cas
for the Western Union, quietly informed his client
that they could never win, for the records showe
that Bell was the inventor. He advised the West
ern Union to settle the case out of court and hi
advice was taken. This great corporation war wa
concluded by a treaty (November 10, 1879) i

hich the Western Union acknowledged that Bell as the inventor, that his patents were valid, and greed to retire from the telephone business. The ell Company, on its part, agreed to buy the West- n Union Telephone System, to pay the Western nion a royalty of twenty per cent on all telephone ntals, and not to engage in the telegraph busi- ess. Had this case been decided against the Bell ompany it is almost certain that the telephone ould have been smothered in the interest of the legraph and its development delayed for many ears.

Soon after the settlement of the Western Union it, the original group which had created the tele- one withdrew from the scene. Bell went back to aching deaf-mutes. He has since busied himself th the study of airplanes and wireless, and has vented an instrument for transmitting sound by ght. The new telephone company offered him 0,000 a year as chief inventor, but he replied that could not invent to order. Thomas Sanders re- ived somewhat less than $1,000,000 and lost most it exploiting a Colorado gold mine. Gardiner ubbard withdrew from business and devoted the t years of his life to the National Geographic ciety. Thomas Watson, after retiring from the

telephone business, bought a ship-building yar near Boston, which has been successful.

In making this settlement with the Weste Union, the Bell interests not only eliminated competitor but gained great material advantage They took over about 56,000 telephone station located in 55 cities and towns. They also soon ac quired the Western Electric Manufacturing Com pany, which under the control of the Weste Union had developed into an important concer for the manufacture of telephone supplies. Un der the management of the Bell Company thi corporation, which now has extensive factories i Hawthorne, Ill., produces two-thirds of the world' telephone apparatus. With the Western Electri Vail has realized the fundamental conception un derlying his ideal telephone system — the stand ardization of equipment. For the accomplishmen of his idea of a national telephone system, instea of a parochial one, Mr. Vail organized, in 1881, th American Bell Telephone Company, a corporatio that really represented the federalization of all th telephone activities of the subsidiary companie The United States was divided into several section in each of which a separate company was organ ized to develop the telephone possibilities of tha

articular area. In 1899 the American Telephone nd Telegraph Company took over the business and roperties of the American Bell Company. The arger corporation built toll lines, connected these maller systems with one another, and thus made it ossible for Washington to talk to New York, New ork to Chicago, and ultimately — Boston to San rancisco. An enlightened policy led the Bell Com- any frequently to establish exchanges in places here there was little chance of immediate profit. nder this stimulation the use of this instrument xtended rapidly, yet it is in the last twenty ears that the telephone has grown with accel- ated momentum. In 1887 there were 170,000 bscribers in the United States, and in 1900 ere were 610,000; but in 1906 the American elephone and Telegraph Company was furnishing service to 2,550,000 stations, and in 1916 to ,000,000. Clearly it is only since 1900 that the lephone has become a commonplace of American istence. Up to 1900 it had grown at the rate of out 13,000 a year; whereas since 1900 it has own at the rate of 700,000 a year. The explana- n is that charges have been so reduced that the ephone has been brought within the reach of actically every business house and every family.

Until the year 1900 every telephone subscriber ha
to pay $240 a year, and manifestly only families i
affluent circumstances could afford such a luxur
About that time a new system of charges known a
the "message rate" plan was introduced, accordin
to which the subscriber paid a moderate price for
stipulated number of calls, and a pro rata charg
for all calls in excess of that number. Probabl
no single change in any business has had such a
instantaneous effect. The telephone, which ha
hitherto been an external symbol of prosperity
suddenly became the possession of almost ever
citizen.

Other companies than the Bell interests hav
participated in this development. The only tim
the Bell Company has had no competitor, Mr. Va
has said, was at the Philadelphia Centennial i
1876. Some of this competition has benefited th
public but much of it has accomplished little excep
to enrich many not over-scrupulous promoter
Groups of farmers who frequently started com
panies to furnish service at cost did much to exten
the use of the telephone. Many of the companie
which, when the Bell patents expired in 189
sprang up in the Middle West, also manifeste
great enterprise and gave excellent service. Thes

mpanies have made valuable contributions, of hich perhaps the automatic telephone, an instrument which enables a subscriber to call up his party" directly, without the mediation of "central," is the most ingenious. Although due acnowledgment must be made of the honesty and nterprise with which hundreds of the independits are managed, the fact remains that they are a reat economic waste. Most of them give only a cal service, no company having yet arisen which ms to duplicate the comprehensive national plans the greater corporation. As soon as an indendent obtains a foothold, the natural consequence that every business house and private household ust either be contented with half service, or uble the cost of the telephone by subscribing to o companies. It is not unlikely that the "indendents" have exercised a wholesome influence on the Bell Corporation, but, as the principle of vernment regulation rather than individual comtition has now become the established method of ntrolling monopoly, this influence will possess s virtue in the future. In addition to these indendent enterprises, the telephone has unfortutely furnished an opportunity for stock-jobbing nemes on a considerable scale. The years from

1895 to 1905 witnessed the growth of many bubbl
of this kind; one group of men organized n
far from two hundred telephone companies. The
would go into selected communities, promise a s
perior service at half the current rates, enlist th
coöperation of "leading" business men, sell th
stock largely in the city or town to be benefite
make large profits in the construction of the lin
and the sale of equipment — and then decamp f
pastures new. The multitudinous bankruptci
that followed in the wake of such exploiters
length brought their activities to an end.

CHAPTER V

THE DEVELOPMENT OF PUBLIC UTILITIES

HE streets of practically all American cities, as ey appeared in 1870 and as they appear today, esent one of the greatest contrasts in our indus- al development. Fifty years ago only a few ckering gas lamps lighted the most traveled oroughfares. Only the most prosperous business uses and homes had even this expensive illumin- on; most obtained their artificial light from the w illuminant known as kerosene. But it was the chanism of city transportation that would have ked the strangest in our eyes. New York City d built the world's first horse-car line in 1832, and ce that year this peculiarly American contriv- e has had the most extended development. In 0, indeed, practically every city of any impor- ce had one or more railways of this type. New k possessed thirty different companies, each rating an independent system. In Philadelphia,

Chicago, St. Louis, and San Francisco the growt
of urban transportation had been equally ha
hazard. The idea of combining the several stre
railways into one comprehensive corporation ha
apparently occurred to no one. The passenger
in their peregrinations through the city, had fr
quently to pay three or four fares; competition w
thus the universal rule. The mechanical equipme
similarly represented a primitive state of organ
zation. Horses and mules, in many cases hideo
physical specimens of their breeds, furnished th
motive power. The cars were little "bobtailed
receptacles, usually badly painted and more oft
than not in a desperate state of disrepair.
many cities the driver presided as a solitary aut
crat; the passengers on entrance deposited the
coins in a little fare box. At night tiny oil lam
made the darkness visible; in winter time shiv
ing passengers warmed themselves by pulling th
coat collars and furs closely about their necks a
thrusting their lower members into a heap of stra
piled almost a foot deep on the floor.

Who would have thought, forty years ago, th
the lighting of these dark and dirty streets and t
modernization of these local railway systems wou
have given rise to one of the most astoundi

apters in our financial history and created hun-
eds, perhaps thousands, of millionaires? When
homas A. Edison invented the incandescent light,
d when Frank J. Sprague in 1887 constructed the
st practicable urban trolley line, in Richmond,
rginia, they liberated forces that powerfully af-
cted not only our social and economic life but our
olitical institutions. These two inventions intro-
uced a new phrase — "Public Utilities." Com-
ned with the great growth and prosperity of the
ties they furnished a fruitful opportunity to several
rticularly famous groups of financial adventurers.
ney led to the organization of "syndicates" which
voted all their energies, for a quarter of a century,
exploiting city lighting and transportation sys-
ms. These syndicates made a business of enter-
g city after city, purchasing the scattered street
ilway lines and lighting companies, equipping
em with electricity, combining them into unified
stems, organizing large corporations, and float-
g huge issues of securities. A single group of six
en — Yerkes, Widener, Elkins, Dolan, Whitney,
d Ryan — combined the street railways, and
many cases the lighting companies, of New
ork, Philadelphia, Chicago, Pittsburgh, and at
ast a hundred towns and cities in Pennsylvania,

Connecticut, Rhode Island, Massachusetts, O
Indiana, New Hampshire, and Maine. Eit
jointly or separately they controlled the gas
electric lighting companies of Philadelphia, Re
ing, Harrisburg, Atlanta, Vicksburg, St. Augusti
Minneapolis, Omaha, Des Moines, Kansas C
Sioux City, Syracuse, and about seventy ot
communities. A single corporation develo
nearly all the trolley lines and lighting compan
of New Jersey; another controlled similar utilit
in San Francisco and other cities on the Pac
Coast. In practically all instances these syn
cates adopted precisely the same plan of operati
In so far as their activities resulted in cheap, co
fortable, rapid, and comprehensive transit syste
and low-priced illumination, their activities grea
benefited the public. The future historian
American society will probably attribute enormo
influence to the trolley car in linking urban co
munity with urban community, in extending t
radius of the modern city, in freeing urban worke
from the demoralizing influences of the tenemen
in offering the poorer classes comfortable homes
the surrounding country, and in extending gener
enlightenment by bringing about a closer huma
intercourse. Indeed, there is probably no sing

fluence that has contributed so much to the pleasure and comfort of the masses as the trolley car. Yet the story that I shall have to tell is not a pleasant one. It is impossible to write even a brief outline of this development without plunging deeply into the two phases of American life of which we have most cause to be ashamed; these are American municipal politics and the speculative aspects of Wall Street. The predominating influences in American city life have been the great franchise corporations. Practically all the men that have had most to do with developing our public utilities have also had the greatest influence in city politics. In New York, Thomas F. Ryan and William C. Whitney were the powerful, though invisible, powers in Tammany Hall. In Chicago, Charles T. Yerkes controlled mayors and city councils; he even extended his influence into the state government, controlling governors and legislatures. In Philadelphia, Widener and Elkins dominated the City Hall and also became part of the Quay machine of Pennsylvania. Mark Hanna, the most active force in Cleveland railways, was also the political boss of the State. Roswell P. Flower, chief agent in developing Brooklyn Rapid Transit, had been Governor of New York; Patrick

Calhoun, who monopolized the utilities of Sa
Francisco and other cities, presided likewise ov
the city's inner politics. The Public Service Co
poration of New Jersey also comprised a larg
political power in city and state politics. It
hardly an exaggeration to say that in the most a
tive period, that from 1880 to 1905, the powe
that developed city railway and lighting companie
in American cities were identically the same owne
that had the most to do with city government. I
the minds of these men politics was necessarily a
much a part of their business as trolley poles an
steel rails. This type of capitalist existed only c
public franchises — the right to occupy the publ
streets with their trolley cars, gas mains, and ele
tric light conduits; they could obtain these priv
leges only from complaisant city governments, an
the simplest way to obtain them was to contr
these governments themselves. Herein we ha
the simple formula which made possible one of th
most profitable and one of the most adventuro
undertakings of our time.

An attempt to relate the history of all the
syndicates would involve endless repetition.
we have the history of one we have the histo
of practically all. I have therefore selected,

ypical, the operations of the group that devel-
ped the street railways and, to a certain extent,
ne public lighting companies, in our three great-
st American cities — New York, Chicago, and
hiladelphia.

One of the men who started these enterprises ac-
ually had a criminal record. William H. Kem-
le, an early member of the Philadelphia group, had
een indicted for attempting to bribe the Penn-
lvania Legislature; he had been convicted and
entenced to one year in the county jail and had
scaped imprisonment only by virtue of a pardon
btained through political influence. Charles T.
erkes, one of his partners in politics and street
ilway enterprises, had been less fortunate, for he
ad served seven months for assisting in the em-
ezzlement of Philadelphia funds in 1873. It was
is circumstance in Yerkes's career which impelled
m to leave Philadelphia and settle in Chicago
here, starting as a small broker, he ultimately ac-
ired sufficient resources and influence to embark
that street railway business at which he had al-
ady served an extensive apprenticeship. Under
s domination, the Chicago aldermen attained a
pravity that made them notorious all over the
rld. They openly sold Yerkes the use of the

streets for cash and constantly blocked the effort which an infuriated populace made for reform Yerkes purchased the old street railway lines, line his pockets by making contracts for their recon struction, issued large flotations of watered stock heaped securities upon securities and reorganiza tion upon reorganization and diverted their asset to business in a hundred ingenious ways.

In spite of the crimes which Yerkes perpetrate in American cities, there was something refreshin and ingratiating about the man. Possibly this i because he did not associate any hypocrisy wit his depredations. "The secret of success in m business," he once frankly said, "is to buy ol junk, fix it up a little, and unload it upon othe fellows." Certain of his epigrams — such as, "It i the strap-hanger who pays the dividends" — hav likewise given him a genial immortality. The fac that, after having reduced the railway system c Chicago to financial pulp and physical dissolution he finally unloaded the whole useless mass, at handsome personal profit, upon his old New Yor friends, Whitney and Ryan, and decamped to Lon don, where he carried through huge transit en terprises, clearly demonstrated that Yerkes was buccaneer of no ordinary caliber.

Yerkes's difficulties in Philadelphia indirectly made possible the career of Peter A. B. Widener. For Yerkes had become involved in the defalcation of the City Treasurer, Joseph P. Mercer, whose translation to the Eastern Penitentiary left vacant the municipal office into which Mr. Widener now promptly stepped. Thus Mr. Widener, as is practically the case with all these street railway magnates, was a municipal politician before he became a financier. The fact that he attained the city treasurership shows that he had already gone far, for it was the most powerful office in Philadelphia. He had all those qualities of suavity, joviality, firmness, and personal domination that made possible success in American local politics a generation ago. His occupation contributed to his advancement. In recent years Mr. Widener, as the owner of great art galleries and the patron of philanthropic and industrial institutions, has been a national figure of the utmost dignity. Had you dropped into the Spring Garden Market in Philadelphia forty years ago, you would have found a portly gentleman, clad in a white apron, and armed with a cleaver, presiding over a shop decorated with the design — "Peter A. B. Widener, Butcher." He was constantly joking with his customers and

visitors, and in the evening he was accustomed
foregather with a group of well-chosen spirits wh
had been long famous in Philadelphia as the "a
night poker players." A successful butcher sho
in Philadelphia in those days played about th
same part in local politics as did the saloon in Ne
York City. Such a station became the headqua
ters of political gossip and the meeting ground
a political clique; and so Widener, the son of
poor German bricklayer, rapidly became a politic
leader in the Twentieth Ward, and soon found h
power extending even to Harrisburg. A few yea
ago Widener presided over a turbulent meeting
Metropolitan shareholders in Newark, New Jerse
The proposal under consideration was the tran
ference of all the Metropolitan's visible assets
a company of which the stockholders knew not
ing. When several of these stockholders aro
and demanded that they be given an opportuni
to discuss the projected lease, Widener turned
them and said, in his politest and blandest ma
ner: "You can vote first and discuss afterward.
Widener displayed precisely these same qualities
ingratiating arrogance and good-natured contem
as a Philadelphia politician. He was a man
big frame, alert and decisive in his movement

and a ready talker; in business he was given much to living in the clouds — a born speculator — emphatically a "boomer." His sympathies were generous, at times emotional; it is said that he has even been known to weep when discussing his fine collection of Madonnas. He showed this personal side in his lifelong friendship and business association with William L. Elkins, a man much inferior to him in ability. Indeed, Elkins's great fortune was little more than a free gift from Widener, who carried him as a partner in all his deals. Elkins became Widener's bondsman when the latter entered the City Treasurer's office; the two men lived near each other on the same street, and this association was cemented when Widener's oldest son married Elkins's daughter. Elkins had started life as an entry clerk in a grocery store, had made money in the butter and egg business, had "struck oil" at Titusville in 1862, and had succeeded in exchanging his holdings for a block of Standard Oil stock. He too became a Philadelphia politician, but he had certain hard qualities — he was closefisted, slow, plodding — that prevented him from achieving much success.

For the other members of this group we must now change the scene to New York City. In the early

eighties certain powerful interests had formed plans for controlling the New York transit fields. Prominent among them was William Collins Whitney, a very different type of man from the Philadelphians. Born in Conway, Massachusetts, in 1841, he came from a long line of distinguished and intellectual New Englanders. At Yale his wonderful mental gifts raised him far above his fellows; he divided all scholastic honors there with his classmate, William Graham Sumner, afterwards Yale's great political economist. Soon after graduation Whitney came to New York and rapidly forged ahead as a lawyer. Brilliant, polished, suave, he early displayed those qualities which afterward made him the master mind of presidential Cabinets and the maker of American Presidents. Physically handsome, loved by most men and all women, he soon acquired a social standing that amounted almost to a dictatorship. His early political activities had greatly benefited New York. He became a member of that group which, under the leadership of Joseph H. Choate and Samuel J. Tilden, accomplished the downfall of William M. Tweed. Whitney remained Tilden's political protégé for several years. Though high-bred and luxury-loving, as a young man he was not averse to hard political work, and man-

old-timers still remember the days when "Bill" Whitney delivered cart-tail harangues on the lower east side. By 1884 he had become the most prominent Democrat in New York — always a foe to Tammany — and as such he contributed largely to Cleveland's first election, became Secretary of the Navy in Cleveland's cabinet and that great President's close friend and adviser. As Secretary of the Navy, Whitney, who found the fleet composed of a few useless hulks left over from the days of Farragut, created the fighting force that did such efficient service in the Spanish War. The fact that the United States is now the third naval power is largely owing to these early activities of Whitney.

Certainly all this national service forms a strange prelude to Whitney's activities in the public utilities of New York and other cities. Had he died, indeed, in his fiftieth year, his name would be renowned today as a worker for the highest ideals of American citizenship. What suddenly made him turn his back upon his past, join his former enemies in Tammany Hall, and engage in these great speculative enterprises? The simplest explanation is that, with his ability and ambition, Whitney had the luxurious tastes of a

Medici. At the height of his career his financial success found expression in a magnificent house which he established on Fifth Avenue. Its furnishings were one of the wonders of New York. Whitney ransacked the art treasures of Europe, stripped medieval castles of their carvings and tapestries, ripped whole staircases and ceilings from the repose of centuries, and relaid them in this abode of splendor, and here he entertained with a lavishness that astounded New York. This single exploit pictures the man. Everything that Whitney did and was — his house, his financial transactions, his Wall Street speculations, the rewards which he gave his friends — assumed heroic proportions. But these things all demanded money. The dilapidated horse railways of New York offered him his most convenient opportunity for amassing it.

But Whitney had not proceeded far when he came face to face with a quiet and energetic young man who had already made considerable progress in the New York transit field. This was a Virginian of South Irish descent who had started life as a humble broker's clerk twelve or fourteen years before. His name was Thomas Fortune Ryan. Few men have wielded greater power in American finance, but in 1884 Ryan was merely a

ruddy-faced, clean-cut, and clean-living Irishman of thirty-three, who could be depended on to execute quickly and faithfully orders on the New York Stock Exchange — even though they were small ones — and who, in unostentatious fashion, had already acquired much influence in Tammany Hall. With his six feet of stature, his extremely slender figure, his long legs, his long arms, his raiment — which always represented the height of fashion and tended slightly toward the flashy — Ryan made a conspicuous figure wherever he went. He was born in 1851, on a small farm in Nelson County, Virginia. The Civil War, which broke out when Ryan was a boy of ten, destroyed the family fortune and in 1868, when seventeen, he began life as a dry-goods clerk in Baltimore, fulfilling the tradition of the successful country boy in the large city by marrying his employer's daughter. When his father-in-law failed, in 1870, Ryan came to New York, went to work in a broker's office, and succeeded so well that, in a few years, he was able to purchase a seat on the Stock Exchange. He was sufficiently skillful as a broker to number Jay Gould among his customers and to inspire a prophecy by William C. Whitney that, if he retained his health, he would become one of the richest men

in the country. Afterwards, when he knew him more intimately, Whitney elaborated this estimate by saying that Ryan was "the most adroit, suave, and noiseless man he had ever known." Ryan had two compelling traits that soon won for him these influential admirers. First of all was his marvelous industry. His genius was not spasmodic. He worked steadily, regularly, never losing a moment, never getting excited, going, day after day, the same monotonous dog-trot, easily outdistancing scores of apparently stronger men. He also had the indispensable faculty of silence. He has always been the least talkative man in Wall Street, but, with all his reserve, he has remained the soul of courtesy and outward good nature.

Here, then, we have the characters of this great impending drama — Yerkes in Chicago, Widener and Elkins in Philadelphia, Whitney and Ryan in New York. These five men did not invariably work as a unit. Yerkes, though he had considerable interest in Philadelphia, which had been the scene of his earliest exploits, limited his activities largely to Chicago. Widener and Elkins, however, not only dominated Philadelphia traction but participated in all of Yerkes's enterprises in Chicago and held an equal interest with Whitney and

Ryan in New York. The latter Metropolitan pair, though they confined their interest chiefly to their own city, at times transferred their attention to Chicago. Thus, for nearly thirty years, these five men found their oyster in the transit systems of America's three greatest cities — and, for that matter, in many others also.

An attempt to trace the convolutions of America's street railway and public lighting finance would involve a puzzling array of statistics and an inextricable complexity of stocks, bonds, leases, holding companies, operating companies, construction companies, reorganizations, and the like. Difficult and apparently impenetrable as is this financial morass, the essential facts still stand out plainly enough. As already indicated, the fundamental basis upon which the whole system rested was the control of municipal politics. The story of the Metropolitan's manipulation of the New York street railways starts with one of the most sordid episodes in the municipal annals of America's largest city. Somewhat more than thirty years ago, a group of New York city fathers acquired an international fame as the "boodle aldermen." These men had finally given way to the importunities of a certain Jacob Sharp, an eccentric

New York character, who had for many year
operated New York City railways, and granted
franchise for the construction of a horse-car lin
on lower Broadway. Soon after voting this fran
chise, regarded as perhaps the most valuable i
the world, these same aldermen had begun t
wear diamonds, to purchase real estate, and giv
other outward evidences of unexpected prospe
ity. Presently, however, these city fathers starte
a migration to Canada, Mexico, Spain, and othe
countries where the processes of extradition di
not work smoothly. Sharp's enemies had suc
ceeded in precipitating a legislative investigatio
under the very capable leadership of Roscoe Conk
ling, who had little difficulty in showing that Shar
had purchased his aldermen for $500,000 cash. I
a short time, such of the aldermen as were a
cessible to the police were languishing in priso
and Sharp had been arrested on twenty-one indic
ments for bribery and sentenced to four year
hard labor — a sentence which he was saved fro
serving by his lonely and miserable death in Lu
low Street Jail. In the delirium preceding h
dissolution Sharp raved constantly about h
Broadway railroad and his enemies; it was ap
parently his belief that the investigation which ha

ncovered his rascality and the subsequent "per-
ecutions" had been engineered by certain of his
ivals, either to compel Sharp to disgorge his fran-
hise or to produce the facts that would jus-
ify the legislature in annulling it on the ground
f fraud.

Though the complete history of this transaction
an never be written, we do possess certain facts
hat lend some color to this diagnosis. Up to the
ime that Sharp had captured this franchise, Ryan,
Whitney, and the Philadelphians — not as part-
ers, but as rivals — had competed with him for
his prize. At the trial of Arthur J. McQuade in
886, a fellow conspirator, who bore the somewhat
uggestive name of Fullgraff, related certain details
hich, if true, would indicate that Sharp's methods
iffered from those of his rivals only in that they
ad proved more successful. Thirteen members of
ne Board of Aldermen, said Fullgraff, had formed
close corporation, elected a chairman, and
dopted a policy of "business unity in all important
atters," which meant that they proposed to keep
gether in order to secure the highest price for the
roadway franchise. The cable railroad, which
as the one with which Mr. Ryan was identified,
fered $750,000, half in bonds and half in cash.

Mr. Sharp, however, offered $500,000 all in cash The aldermen voted in favor of Sharp because cas was not only a more valuable commodity than th bonds but, to use Alderman Fullgraff's own word — "less easily traced." That Whitney finance lawsuits against the validity of Sharp's franchis appears upon the record, and that Ryan was ac tively promoting the Conkling investigation, i likewise a matter of evidence. Sharp's victory ha the great result of bringing together the three force — Ryan, Whitney, and the Philadelphians — wh had hitherto combated one another as rivals; tha is, it caused the organization of the famous Whi ney-Ryan-Widener-Elkins syndicate. If thes men had inspired all those attacks on Sharp, the maneuver proved successful; for when the invest gation had attained its climax and public indigna tion against Sharp had reached its most furiou stage, that venerable corruptionist, worn down b ill health, and almost crazed by the popular outcry sold his Broadway railroad to Peter A. B. Wid ner, William L. Elkins, and William H. Kembl Thomas F. Ryan became secretary of the ne corporation, and William C. Whitney an activ participant in its affairs.

This Broadway franchise formed the vertebr

olumn of the New York transit system; with it
s a basis, the operators formed the Metropoli-
an Street Railway Company in 1893, commonly
nown as the "Metropolitan." They organized
lso the Metropolitan Traction Company, an or-
anization which enjoys an historic position as the
rst "holding company" ever created in this coun-
ry. Its peculiar attribute was that it did not con-
truct and operate street railways itself, but merely
wned other corporations that did so. Its only
ssets, that is, were paper securities representing
ne ownership and control of other companies.
his "holding company," which has since become
lmost a standardized form of corporation control
this country, was the invention of Mr. Francis
ynde Stetson, one of America's greatest corpo-
tion lawyers. "Mr. Stetson," Ryan is said to
ave remarked, "do you know what you did when
ou drew up the papers of the Metropolitan Trac-
on Company? You made us a great big tin box."
The plan which Whitney and his associates now
llowed was to obtain control, in various ways,
all the surface railways in New York and place
em under the leadership of the Metropolitan.
hrough their political influences they obtained
anchises of priceless value, organized subsidiary

street railway companies, and exchanged the stock of these subsidiary companies for that of the Metropolitan. A few illustrations will show the character of these transactions. They thus acquired practically as a free gift, a franchise to build a cable railroad on Lexington Avenue. At an extremely liberal estimate, this line cost perhaps $2,500,000 to construct, yet the syndicate turned this over to the Metropolitan for $10,000,000 of Metropolitan securities. They similarly acquired a franchise for a line on Columbus Avenue, spending perhaps $500,000 in construction, and handing the completed property over to the Metropolitan for $6,000,000. In exchange for these two properties representing a real investment, it has been maintained, of $3,000,000, the inside syndicates received securities which had a face value of $16,000,000 and which, as will appear subsequently, had a market cash value of not far from $25,000,000. They purchased an old horse-car line on Fulton Street, a line whose assets consisted of one-third of a mile of tracks, ten little box cars, thirty horses, and an operating deficit of $40,000 a year. At auction, its visible assets might have brought $15,000; yet the syndicate turned this over to the Metropolitan for $1,000,000. They spent $50,000

in constructing and equipping a horse railroad on Twenty-eighth and Twenty-ninth Streets and turned this over to the Metropolitan for $3,000,000. For two and a half miles of railroad on Thirty-fourth Street, which represented a cash expenditure of perhaps $100,000, they received $2,000,000 of Metropolitan stock. But it is hardly necessary to catalogue more instances; the plan of operations must now be fairly evident. It was for the members of the syndicate, as individuals, to collect all the properties and new franchises that were available and to transfer them to the Metropolitan at enormously inflated values. So far, all these deals were purely stock transactions — no cash had yet changed hands. When the amalgamation was complete, the insiders found themselves in possession of large amounts of Metropolitan stock. Their scheme for transforming this paper into more tangible property forms the concluding chapter of this Metropolitan story.[1]

Nearly all the properties actually purchased and transferred in the manner described above, had little earning capacity, and therefore little value; they were decrepit horse-car lines in unprofitable

[1] In 1897 the Traction Company dissolved, after distributing $,000,000 as "a voluntary dividend" among its stockholders.

territory. The really valuable roads were thos
that traversed the great north and south thorough
fares — Lenox, Third, Fourth, Sixth, Eighth, an
Ninth Avenues. Many old New York families an
estates had held these properties for years and ha
collected large annual dividends from them. Nat
urally they had no desire to sell, yet their acquisi
tion was essential to the monopoly which the Whit
ney-Ryan syndicate aspired to construct. The
finally leased all these roads, under agreement
which guaranteed large annual rentals. In prac
tically all these cases the Metropolitan, in order t
secure physical possession, agreed to pay rental
that far exceeded the earning capacity of the roa
What is the explanation of such insane finance
We do not have the precise facts in the matte
of the New York railways; but similar operation
in Chicago, which have been officially made pub
lic, shed the utmost light upon the situation. I
order to get possession of a single road in Chicag
Widener and Elkins guaranteed a thirty-five p
cent dividend; to get one Philadelphia line, the
guaranteed 65½ per cent on capital paid in. Thi
of course, was not business; the motives actuatin
the syndicate were purely speculative. In Chicag
Widener and Elkins quietly made large purchase

of the stock in these roads before they leased them to the parent company. The exceedingly profitable lease naturally gave such stocks a high value, in case they preferred to sell; if they held them, they reaped huge rewards from the leases which they had themselves decreed. Perhaps their most remarkable exploit was the lease of the West Division Railway Company of Chicago to the West Chicago Street Railroad. Widener and Elkins controlled the West Division Railway; their partner, Charles T. Yerkes, controlled the latter corporation. The negotiation of a lease, therefore, was a purely informal matter; the partners were merely dealing with one another; yet Widener and Elkins received a fee of $5,000,000 as personal compensation for negotiating this lease!

But this whole leasing system, both in New York and Chicago, entailed scandals perhaps even more reprehensible. All these leased properties, when taken over, were horse-car lines, and their transformation into electrically propelled systems involved reconstruction operations on an extensive scale. It seems perfectly clear that the chief motive which inspired these extravagant leases was the determination of the individuals who made up the syndicate to obtain physical possession and

to make huge profits on construction. The "construction accounts" of the Metropolitan in New York form the most mysterious and incredible chapter in its history. The Metropolitan reports show that they spent anywhere from $500,000 to $600,000 a mile building underground trolley lines which, at their own extravagant estimate, should have cost only $150,000. In a few years untold millions, wasted in this way, disappeared from the Metropolitan treasury. In 1907 the Public Service Commission of New York began investigating these "construction accounts," but it had not proceeded far when the discovery was made that all the Metropolitan books containing the information desired had been destroyed. All the ledgers, journals, checks, and vouchers containing the financial history of the Metropolitan since its organization in 1893 had been sold for $117 to a junkman, who had agreed in writing to grind them into pulp, so that they would be safe from "pryin eyes." We shall therefore never know precisel how this money was spent. But here again th Chicago transactions help us to an understanding In 1898 Charles T. Yerkes, with that cynical frankness which some people have regarded as a redeeming trait in his character, opened his books for th

preceding twenty-five years to the Civic Federation of Chicago. These books disclosed that Mr. Yerkes and his associates, Widener and Elkins, had made many millions in reconstructing the Chicago lines at prices which represented gross overcharges to the stockholders. For this purpose Yerkes, Widener, and Elkins organized the United States Construction Company and made contracts for installing the new electric systems on the lines which they controlled by lease or stock ownership. It seems a not unnatural suspicion that the vanished Metropolitan books would have disclosed similar performances in New York.

The concluding chapter of this tragedy has its setting in the Stock Exchange. These inside gentlemen, as already said, received no cash as their profits from these manipulations — only stock. But in the eyes of the public this stock represented an enormous value. Metropolitan securities, for example, represented the control and ownership of all the surface transit business in the city of New York. Naturally, it had a great investment value. When it began to pay regularly seven per cent dividends, the public appetite for Metropolitan became insatiable. The eager purchasers did not know, what we know now, that the Metropolitan did not

earn these dividends and never could have earned them. The mere fact that it was paying, as rentals on its leased lines, annual sums far in excess of their earning capacity, necessarily prevented anything in the nature of profitable operation. The unpleasant fact is that these dividends were paid with borrowed money merely to make the stock marketable. It is not unlikely that the padded construction accounts, already described, may have concealed large disbursements of money for unearned dividends. When the Metropolitan was listed in 1897, it immediately went beyond par. The excitement that followed forms one of the most memorable chapters in the history of Wall Street. The investing public, egged on by daring and skillful stock manipulators, simply went mad and purchased not only Metropolitan but street railway shares that were then even more speculative. It was in these bubble days that Brooklyn Rapid Transit soared to heights from which it subsequently descended precipitately. Under this stimulus Metropolitan stock ultimately sold at $269 a share. While the whole investing public was scrambling for Metropolitan, the members of the exploiting syndicate found ample opportunity to sell. The real situation became apparent when William

C. Whitney died in 1904 leaving an estate valued at $40,000,000. Not a single share of Metropolitan was found among his assets! The final crash came in 1907, when the Metropolitan, a wrecked and plundered shell, confessed insolvency and went into a receivership. Those who had purchased its stock found their holdings as worthless as the traditional western gold mine. The story of the Chicago and Philadelphia systems, as well as that of numerous other cities, had been essentially the same. The transit facilities of millions of Americans had merely become the instruments of a group of speculators who had made huge personal fortunes and had left, as a monument of their labors, street railway lines whose gross overcapitalization was apparent to all and whose physical dilapidation in many cases revealed the character of their management.

It seems perhaps an exaggeration to say that the enterprises which have resulted in equipping our American cities and suburbs with trolley lines and electric lighting facilities have followed the plan of campaign sketched above. Perhaps not all have repeated the worst excesses of the syndicate that so remorselessly exploited New York, Chicago, and Philadelphia. Yet in most cases these elaborate undertakings have been largely speculative in

character. Huge issues of fictitious stock, created purely for the benefit of inner rings, have been almost the prevailing rule. Stock speculation and municipal corruption have constantly gone hand in hand everywhere with the development of the public utilities. The relation of franchise corporations to municipalities is probably the thing which has chiefly opened the eyes of Americans to certain glaring defects in their democratic organization. The popular agitation which has resulted has led to great political reforms. The one satisfaction which we can derive from such a relation as that given above is that, after all, it is representative of a past era in our political and economic life. No new "Metropolitan syndicate" can ever repeat the operations of its predecessors. Practically every State now has utility commissions which regulate the granting of franchises, the issue of securities, the details of construction and equipment and service. An awakened public conscience has effectively ended the alliance between politics and franchise corporations and the type of syndicate described in the foregoing pages belongs as much to our American past as that rude frontier civilization with which, after all, it had many characteristics in common.

CHAPTER VI

MAKING THE WORLD'S AGRICULTURAL MACHINERY

THE Civil War in America did more than free the negro slave: it freed the white man as well. In the Civil War agriculture, for the first time in history, ceased to be exclusively a manual art. Up to that time the typical agricultural laborer had been a bent figure, tending his fields and garnering his crops with his own hands. Before the war had ended the American farmer had assumed an erect position; the sickle and the scythe had given way to a strange red chariot, which, with practically no expenditure of human labor, easily did the work of a dozen men. Many as have been America's contributions to civilization, hardly any have exerted greater influence in promoting human welfare than her gift of agricultural machinery. It seems astounding that, until McCormick invented his reaper, in 1831, agricultural methods, in both the New and the Old World, differed little from those

that had prevailed in the days of the Babylonians. The New England farmer sowed his fields and reaped his crops with almost identically the same instruments as those which had been used by the Roman farmer in the time of the Gracchi. Only a comparatively few used the scythe; the great majority, with crooked backs and bended knees, cut the grain with little hand sickles precisely like those which are now dug up in Etruscan and Egyptian tombs.

Though McCormick had invented his reaper in 1831, and though many rival machines had appeared in the twenty years preceding the Civil War, only the farmers on the great western plains had used the new machinery to any considerable extent. The agricultural papers and agricultural fairs had not succeeded in popularizing these great labor-saving devices. Labor was so abundant and so cheap that the farmer had no need of them. But the Civil War took one man in three for the armies, and it was under this pressure that the farmer really discovered the value of machinery. A small boy or girl could mount a McCormick reaper and cut a dozen acres of grain in a day. This circumstance made it possible to place millions of soldiers in the field and to feed the armies from farms

which mature men did very little work. But the reaper promoted the Northern cause in other ways. Its use extended so in the early years of the war that the products of the farms increased on an enormous scale, and the surplus, exported to Europe, furnished the liquid capital that made possible the financing of the war. Europe gazed in astonishment at a new spectacle in history; that of a nation fighting the greatest war which had been known up to that time, employing the greater part of her young and vigorous men in the armies, and yet growing infinitely richer in the process. The Civil War produced many new implements of warfare, such as the machine gun and the revolving turret for battleships, but, so far as determining the result was concerned, perhaps the most important was the reaper.

Extensive as the use of agricultural machinery became in the Civil War, that period only faintly foreshadowed the development that has taken place since. The American farm is today like a huge factory; the use of the hands has almost entirely disappeared; there are only a few operations of husbandry that are not performed automatically. In Civil War days the reaper merely cut the grain; now machinery rakes it up and binds it into sheaves

and threshes it. Similar mechanisms bind corn and rice. Machinery is now used to plant potatoes grain, cotton, and other farm products are sown automatically. The husking bees that formed one of our social diversions in Civil War days have disappeared, for particular machines now rip the husks off the ears. Horse hay-forks and horse hay rakes have supplanted manual labor. The mere names of scores of modern instruments of farming all unknown in Civil War days — hay carriers, hay loaders, hay stackers, manure spreaders, horse corn planters, corn drills, disk harrows, disk ploughs steam ploughs, tractors, and the like — give some suggestion of the extent to which America has made mechanical the most ancient of occupations. In thus transforming agriculture, we have de veloped not only our own Western plains, but we have created new countries. Argentina could hardly exist today except for American agricultural machinery. Ex-President Loubet declared, a few years ago, that France would starve to death ex cept for the farming machines that were turned out in Chicago. There is practically no part of the world where our self-binders are not used. In many places America is not known as the land of freedom and opportunity, but merely as "the place

from which the reapers come." The traveler suddenly comes upon these familiar agents in every European country, in South America, in Egypt, China, Algiers, Siberia, India, Burma, and Australia. For agricultural machinery remains today, what it has always been, almost exclusively an American manufacture. It is practically the only native American product that our European competitors have not been able to imitate. Tariff walls, bounty systems, and all the other artificial aids to manufacturing have not developed this industry in foreign lands, and today the United States produces four-fifths of all the agricultural machinery used in the world. The International Harvester Company has its salesmen in more than fifty countries, and has established large American factories in many nations of Europe.

One day, a few years before his death, Prince Bismarck was driving on his estate, closely following a self-binder that had recently been put to work. The venerable statesman, bent and feeble, seemed to find a deep melancholy interest in the operation.

"Show me the thing that ties the knot," he said. It was taken to pieces and explained to him in detail.

"Can these machines be made in Germany?" he asked.

"No, your Excellency," came the reply. "They can be made only in America."

The old man gave a sigh. "Those Yankees are ingenious fellows," he said. "This is a wonderful machine."

In this story of American success, four names stand out preëminently. The men who made the greatest contributions were Cyrus H. McCormick, C. W. Marsh, Charles B. Withington, and John F. Appleby. The name that stands foremost, of course, is that of McCormick, but each of the others made additions to his invention that have produced the present finished machine. It seems like the stroke of an ironical fate which decreed that since it was the invention of a Northerner, Eli Whitney, that made inevitable the Civil War, so it was the invention of a Southerner, Cyrus McCormick, that made inevitable the ending of that war in favor of the North.

McCormick was born in Rockbridge County, Virginia, on a farm about eighteen miles from Staunton. He was a child of that pioneering Scotch-Irish race which contributed so greatly to the settlement of this region and which afterward

made such inestimable additions to American citizenship. The country in which he grew up was rough and, so far as the conventionalities go, uncivilized; the family homestead was little more than a log cabin; and existence meant a continual struggle with a not particularly fruitful soil. The most remarkable figure in the McCormick home circle, and the one whose every-day life exerted the greatest influence on the boy, was his father. The older McCormick had one obsessing idea that made him the favorite butt of the local humorists. He believed that the labor spent in reaping grain was a useless expenditure of human effort and that machinery might be made to do the work. Other men, in this country and in Europe, had nourished similar notions. Several Englishmen had invented reaping machines, all of which had had only a single defect — they would not reap. An ingenious English actor had developed a contrivance which would cut imitation wheat on the stage, but no one had developed a machine that would work satisfactorily in real life. Robert McCormick spent the larger part of his days and nights tinkering at a practical machine. He finally produced a horrific contrivance, made up of whirling sickles, knives, and revolving rods, pushed from behind by two

horses; when he tried this upon a grain-field however, it made a humiliating failure.

Evidently Robert McCormick had ambition far beyond his powers; yet without his absur experiments the development of American agricul ture might have waited many years. They becam the favorite topics of conversation in the evenin gatherings that took place about the family lo fire. Robert McCormick had several sons, and on manifested a particular interest in his repeate failures. From the time he was seven years ol Cyrus Hall McCormick became his father's closes companion. Others might ridicule and revile, bu this chubby, bright-eyed, intelligent little boy wa always the keenest listener, the one comfort whic the father had against his jeering neighbors. H also became his father's constant associate in hi rough workshop. Soon, however, the older ma noticed a change in their relations. The boy wa becoming the teacher, and the father was taught By the time Cyrus was eighteen, indeed, he ha advanced so far beyond his father that the lat ter had become merely a proud observer. Youn McCormick threw into the discard all his father' ideas and struck out on entirely new lines. By th time he had reached his twenty-second birthday h

ad constructed a machine which, in all its essen-
al details, is the one which we have today. He
ad introduced seven principles, all of which are
n indispensable part of every reaper constructed
ow. One afternoon he drove his unlovely con-
raption upon his father's farm, with no witnesses
xcept his own family. This group now witnessed
ie first successful attempt ever made to reap with
achinery. A few days later young McCormick
ave a public exhibition at Steele's Tavern, cutting
x acres of oats in an afternoon. The popular
dicule soon changed into acclaim; the new inven-
on was exhibited in a public square and Cyrus
IcCormick became a local celebrity. Perhaps the
ords that pleased him most, however, were those
oken by his father. "I am proud," said the old
an, "to have a son who can do what I failed to
o."

This McCormick reaper dates from 1831; but it
epresented merely the beginnings of the modern
achine. It performed only a single function; it
mply cut the crop. When its sliding blade had
erformed this task, the grain fell back upon a plat-
orm, and a farm hand, walking alongside, raked
his off upon the ground. A number of human har-
esters followed, picked up the bundles, and tied a

few strips of grain around them, making the sheaf The work was exceedingly wearying and particularly hard upon the women who were frequently impressed into service as farm-hands. About 1858 two farmers named Marsh, who lived near De Kalb, Illinois, solved this prohlem. They attached to their McCormick reaper a moving platform upon which the cut grain was deposited. A footboard was fixed to the machine upon which two men stood. As the grain came upon this moving platform these men seized it, bound it into sheaves, and threw it upon the field. Simple as this procedure seemed it really worked a revolution in agriculture; for the first time since the pronouncement of the primal curse, the farmer abandoned his hunchback attitude and did his work standing erect. Yet this device also had its disqualifications, the chief one being that it converted the human sheaf-binder into a sweat-shop worker. It was necessary to bind the grain as rapidly as the platform brought it up; the worker was therefore kept in constant motion; and the consequences were frequently distressing and nerve racking. Yet this "Marsh Harvester" remained the great favorite with farmers from about 1860 to 1874.

All this time, however, there was a growing

feeling that even the Marsh harvester did not represent the final solution of the problem; the air was full of talk and prophecies about self-binders, something that would take the loose wheat from the platform and transform it into sheaves. Hundreds of attempts failed until, in 1874, Charles B. Withington of Janesville, Wisconsin, brought to McCormick a mechanism composed of two steel arms which seized the grain, twisted a wire around it, cut the wire, and tossed the completed sheaf to the earth. In actual practice this contrivance worked with the utmost precision. Finally American farmers had a machine that cut the grain, raked it up, and bound it into sheaves ready for the mill. Human labor had apparently lost its usefulness; a solitary man or woman, perched upon a seat and driving a pair of horses, now performed all these operations of husbandry.

By this time, scores of manufacturers had entered the field in opposition to McCormick, but his acquisition of Withington's invention had apparently made his position secure. Indeed, for the next ten years he had everything his own way. Then suddenly an ex-keeper of a dry-goods store in Maine crossed his path. This was William Deering, a character quite as energetic, forceful, and

pugnacious as was McCormick himself. Though McCormick had made and sold thousands of his self-binders, farmers were already showing signs of discontent. The wire proved a continual annoyance. It mingled with the straw and killed the cattle — at least so the farmers complained; it cut their hands and even found its way, with disastrous results, into the flour mills. Deering now appeared as the owner of a startling invention by John F. Appleby. This did all that the Withington machine did and did it better and quicker and it had the great advantage that it bound with twine instead of wire. The new machine immediately swept aside all competitors; McCormick to save his reaper from disaster, presently perfected a twine binder of his own. The appearance of Appleby's improvement in 1884 completes the cycle of the McCormick reaper on its mechanical side The harvesting machine of fifty nations today is the one to which Appleby put the final touches in 1884. Since then nothing of any great importance has been added.

This outline of invention, however, comprises only part of the story. The development of the reaper business presents a narrative quite as adventurous as that of the reaper itself. Cyrus

McCormick was not only a great inventor; he was also a great business man. So great was his ability in this direction, indeed, that there has been a tendency to discredit his achievements as a creative genius and to attribute his success to his talents as an organizer and driver of industry. "I may make a million dollars from this reaper," said McCormick, in the full tide of enthusiasm over his invention; and these words indicate an indispensable part of his program. He had no miserly instinct but he had one overpowering ambition. It was McCormick's conviction, almost religious in its fervor, that the harvester business of the world belonged to him. As already indicated, plenty of other hardy spirits, many of them almost as commanding personalities as himself, disputed the empire. Not far from 12,000 patents on harvesting machines were granted in this country in the fifty years following McCormick's invention, and more than two hundred companies were formed to compete for the market. McCormick always regarded these competitors as highwaymen who had invaded a field which had been almost divinely set apart for himself. A man of covenanting antecedents, heroic in his physical proportions, with a massive, Jove-like head and beard, tirelessly devoted to his work,

watching every detail with a microscopic eye, mar shaling a huge force of workers who were as pos sessed by this one overruling idea as was Mc Cormick himself, he certainly presented an almos unassailable battlefront to his antagonists.

The competition that raged between McCormicl and the makers of rival machines was probabl the fiercest that has prevailed in any Americar industry. For marketing his machine McCor mick developed a system almost as ingenious a the machine itself. The popularization of so un gainly and expensive a contrivance as the harves ter proved a slow and difficult task. McCormick a first attempted to build his product on his Virgini farm and for many years it was known as the Vir ginia Reaper. Nearly ten years passed, however before he sold his first machine. The farmer firs refused to take it seriously. "It's a great inven tion," he would say, "but I'm running a farm, no a circus." About 1847 McCormick decided tha the Western prairies offered the finest field for it activities, and established his factory at Chicago then an ugly little town on the borders of a swamp This selection proved to be a stroke of genius, fo it placed the harvesting factory right at the doo of its largest market.

The price of the harvester, however, seemed an insurmountable obstacle to its extensive use. The early settlers of the Western plains had little more than their brawny hands as capital, and the homestead law furnished them their land practically free. In the eyes of a large-seeing pioneer like McCormick this was capital enough. He determined that his reaper should develop this extensive domain, and that the crops themselves should pay the cost. Selling expensive articles on the installment plan now seems a commonplace of business, but in those days it was practically unknown. McCormick was the first to see its possibilities. He established an agent, usually the general storekeeper, in every agricultural center. Any farmer who had a modicum of cash and who bore a reputation for thrift and honesty could purchase a reaper. In payment he gave a series of notes, so timed that they fell due at the end of harvesting seasons. Thus, as the money came in from successive harvests, the pioneer paid off the notes, taking two, three, or four years in the process. In the sixties and seventies immigrants from the Eastern States and from Europe poured into the Mississippi Valley by the hundreds of thousands. Almost the first person who greeted

the astonished Dane, German, or Swede was a
agent of the harvester company, offering to let hi
have one of these strange machines on these term
Thus the harvester, under McCormick's compre
hensive selling plans, did as much as the homestea
act in opening up this great farming region.

McCormick covered the whole agricultura
United States with these agents. In this his nu
merous competitors followed suit, and the live
liest times ensued. From that day to this th
agents of harvesting implements have lent muc
animation and color to rural life in this country
Half a dozen men were usually tugging away a
one farmer at the same time. The mere fact tha
the farmer had closed a contract did not end hi
troubles, for "busting up competitors' sales" wa
part of the agent's business. The situation fre
quently reached a point where there was only on
way to settle rival claims and that was by a fiel
contest. At a stated time two or three or fou
rival harvesters would suddenly appear on th
farmer's soil, each prepared to show, by actua
test, its superiority over the enemy. Farmers an
idlers for miles around would gather to witnes
the Homeric struggle. At a given signal the smal
army of machines would spring savagely at a fiel

of wheat. The one that could cut the allotted area in the shortest time was regarded as the winner. The harvester would rush on all kinds of fields, flat and hilly, dry and wet, and would cut all kinds of crops, and even stubble. All manner of tests were devised to prove one machine stronger than its rival; a favorite idea was to chain two back to back, and have them pulled apart by frantic careering horses; the one that suffered the fewest breakdowns would be generally acclaimed from town to town. Sometimes these field tests were the most exciting and spectacular events at country fairs.

Thus the harvesting machine "pushed the frontier westward at the rate of thirty miles a year," according to William H. Seward. It made American and Canadian agriculture the most efficient in the world. The German brags that his agriculture is superior to American, quoting as proof the more bushels of wheat or potatoes he grows to an acre. But the comparison is fallacious. The real test of efficiency is, not the crops that are grown per acre, but the crops that are grown per man employed. German efficiency gets its results by impressing women as cultivators — depressing bent figures that are in themselves a sufficient criticism upon any civilization. America gets its results

by using a minimum of human labor and letting ma
chinery do the work. Thus America's methods ar
superior not only from the standpoint of economic
but of social progress. All nations, including Ger
many, use our machinery, but none to the exten
that prevails on the North American Continent.

Perhaps McCormick's greatest achievement i
that his machine has banished famine whereve
it is extensively used, at least in peace times. Be
fore the reaper appeared existence, even in th
United States, was primarily a primitive struggl
for bread. The greatest service of the harveste
has been that it has freed the world — unles
it is a world distracted by disintegrating war —
from a constant anxiety concerning its food supply
The hundreds of thousands of binders, active i
the fields of every country, have made it certai
that humankind shall not want for its daily brea
When McCormick exhibited his harvester at th
London Exposition of 1851, the *London Times* rid
culed it as "a cross between an Astley chariot,
wheel barrow, and a flying machine." Yet th
same grotesque object, widely used in Canada
Argentina, Australia, South Africa, and India
becomes an engine that really holds the Britis
Empire together.

For the forty years succeeding the Civil War the manufacture of harvesting machinery was a business in which many engaged, but in which few survived. The wildest competition ruthlessly destroyed all but half a dozen powerful firms. Cyrus McCormick died in 1884, but his sons proved worthy successors; the McCormick factory still headed the list, manufacturing, in 1900, one-third of all the self-binders used in the world. The William Deering Company came next and then D. M. Osborne, J. J. Glessner, and W. H. Jones, established factories that made existence exceedingly uncomfortable for the pioneers. Whatever one may think of the motives which caused so many combinations in the early years of the twentieth century, there is no question that irresistible economic forces compelled these great harvester companies to get together. Quick profits in the shape of watered stock had nothing to do with the formation of the International Harvester Company. All the men who controlled these enterprises were individualists, with a natural loathing for trusts, combinations, and pools. They wished for nothing better than to continue fighting the Spartan battle that had made existence such an exciting pastime for more than half a century. But the simple fact

was that these several concerns were destroyin one another; it was a question of joining hands ending the competition that was eating so deepl into their financial resources, or reducing the whol business to chaos. When Mr. George W. Perkins of J. P. Morgan and Company, first attempted t combine these great companies, the antagonism which had been accumulated in many years of war fare constantly threatened to defeat his end. H early discovered that the only way to bring thes men together was to keep them apart. The usua way of creating such combinations is to collect th representative leaders, place them around a table and persuade them to talk the thing over. Suc an amicable situation, however, was impossibl in the present instance. Even when the four bi men — McCormick, Deering, Glessner, and Jones — were finally brought for the final treaty of peac to J. P. Morgan's office, Mr. Perkins had to statio them in four separate rooms and flit from or to another arranging terms. Had these four me been brought face to face, the Harvester Compan would probably never have been formed.

Having once signed their names, however, thes once antagonistic interests had little difficulty i forming a strong combination. The company thu

rought together manufactured 85 per cent of ll the farm machinery used in this country. It wned its own coal-fields and iron mines and its wn forests, and it produces most of the implements sed by 10,000,000 farmers. In 1847 Cyrus McCor- nick made 100 reapers and sold them for $10,000; y 1902 the annual production of the corporation mounted to hundreds of thousands of harvesters - besides an almost endless assortment of other gricultural tools, ploughs, drills, rakes, gasoline ngines, tractors, threshers, cream separators, and he like — and the sales had grown to about $75,- 00,000. This is merely the financial measure of rogress; the genuine achievements of McCor- nick's invention are millions of acres of pro- uctive land and a farming population which is ithout parallel elsewhere for its prosperity, in- elligence, manfulness, and general contentment.

CHAPTER VII

THE DEMOCRATIZATION OF THE AUTOMOBILE

In many manufacturing lines, American genius fo organization and large scale production has devel oped mammoth industries. In nearly all the tend ency to combination and concentration has exer cised a predominating influence. In the early year of the twentieth century the public realized, for th first time, that one corporation, the American Suga Refining Company, controlled ninety-eight per cen of the business of refining sugar. Six large inter ests — Armour, Swift, Morris, the National Pack ing Company, Cudahy, and Schwarzschild and Sulz berger — had so concentrated the packing busines that, by 1905, they slaughtered practically all th cattle shipped to Western centers and furnishe most of the beef consumed in the large citie east of Pittsburgh. The "Tobacco Trust" ha largely monopolized both the wholesale and reta trade in this article of luxury and had also mad

extensive inroads into the English market. The textile industry had not only transformed great centers of New England into an American Lancashire, but the Southern States, recovering from the demoralization of the Civil War, had begun to spin their own cotton and to send the finished product to all parts of the world. American shoe manufacturers had developed their art to a point where "American shoes" had acquired a distinctive standing in practically every European country.

It is hardly necessary to describe in detail each of these industries. In their broad outlines they merely repeat the story of steel, of oil, of agricultural machinery; they are the product of the same methods, the same initiative. There is one branch of American manufacture, however, that merits more detailed attention. If we scan the manufacturing statistics of 1917, one amazing fact stares us in the face. There are only three American industries whose product has attained the billion mark; one of these is steel, the other food products, while the third is an industry that was practically unknown in the United States fifteen years ago. Superlatives come naturally to mind in discussing American progress, but hardly any extravagant phrases could do justice to the development of

American automobiles. In 1899 the United State produced 3700 motor vehicles; in 1916 we mad 1,500,000. The man who now makes a persona profit of not far from $50,000,000 a year in this in dustry was a puttering mechanic when the twen tieth century came in. If we capitalized Henr Ford's income, he is probably a richer man tha Rockefeller; yet, as recently as 1905 his possession consisted of a little shed of a factory which em ployed a dozen workmen. Dazzling as is this pe sonal success, its really important aspects are th things for which it stands. The American automo bile has had its wild-cat days; for the larger par however, its leaders have paid little attention t Wall Street, but have limited their activities ex clusively to manufacturing. Moreover, the auto mobile illustrates more completely than any oth industry the technical qualities that so largely ex plain our industrial progress. Above all, Ame ican manufacturing has developed three characte istics. These are quantity production, standardiz tion, and the use of labor-saving machinery. It because Ford and other manufacturers adapte these principles to making the automobile that th American motor industry has reached such gigant proportions.

A few years ago an English manufacturer, seeking the explanation of America's ability to produce an excellent car so cheaply, made an interesting experiment. He obtained three American automobiles, all of the same "standardized" make, and gave them a long and racking tour over English highways. Workmen then took apart the three cars and threw the disjointed remains into a promiscuous heap. Every bolt, bar, gas tank, motor, wheel, and tire was taken from its accustomed place and piled up, a hideous mass of rubbish. Workmen then painstakingly put together three cars from these disordered elements. Three chauffeurs jumped on these cars, and they immediately started down the road and made a long journey just as acceptably as before. The Englishman had learned the secret of American success with automobiles. The one word "standardization" explained the mystery.

Yet when, a few years before, the English referred to the American automobile as a "glorified perambulator," the characterization was not unjust. This new method of transportation was slow in finding favor on our side of the Atlantic. America was sentimentally and practically devoted to the horse as the motive power for vehicles; and the

fact that we had so few good roads also worked against the introduction of the automobile. Yet here, as in Europe, the mechanically propelled wagon made its appearance in early times. This vehicle, like the bicycle, is not essentially a modern invention; the reason any one can manufacture it is that practically all the basic ideas antedate 1840. Indeed, the automobile is really older than the railroad. In the twenties and thirties, steam stage coaches made regular trips between certain cities in England and occasionally a much resounding power-driven carriage would come careering through New York and Philadelphia, scaring all the horses and precipitating the intervention of the authorities. The hardy spirits who devised these engines, all of whose names are recorded in the encyclopedias, deservedly rank as the "fathers" of the automobile. The responsibility as the actual "inventor" can probably be no more definitely placed. However, had it not been for two developments, neither of them immediately related to the motor car, we should never have had this efficient method of transportation. The real "fathers" of the automobile are Gottlieb Daimler, the German who made the first successful gasoline engine, and Charles Goodyear, the American who discovered

the secret of vulcanized rubber. Without this engine to form the motive power and the pneumatic tire to give it four air cushions to run on, the automobile would never have progressed beyond the steam carriage stage. It is true that Charles Baldwin Selden, of Rochester, has been pictured as the "inventor of the modern automobile" because, as long ago as 1879, he applied for a patent on the idea of using a gasoline engine as motive power, securing this basic patent in 1895, but this, it must be admitted, forms a flimsy basis for such a pretentious claim.

The French apparently led all nations in the manufacture of motor vehicles, and in the early nineties their products began to make occasional appearances on American roads. The type of American who owned this imported machine was the same that owned steam yachts and a box at the opera. Hardly any new development has aroused greater hostility. It not only frightened horses, and so disturbed the popular traffic of the time, but its speed, its glamour, its arrogance, and the haughty behavior of its proprietor, had apparently transformed it into a new badge of social cleavage. It thus immediately took its place as a new gewgaw of the rich; that it had any other purpose to

serve had occurred to few people. Yet the Frenc
and English machines created an entirely differen
reaction in the mind of an imaginative mechani
in Detroit. Probably American annals contai
no finer story than that of this simple America
workman. Yet from the beginning it seemed in
evitable that Henry Ford should play this ap
pointed part in the world. Born in Michigan i
1863, the son of an English farmer who had emi
grated to Michigan and a Dutch mother, Ford ha
always demonstrated an interest in things far re
moved from his farm. Only mechanical device
interested him. He liked getting in the crops
because McCormick harvesters did most of th
work; it was only the machinery of the dairy tha
held him enthralled. He developed destructiv
tendencies as a boy; he had to take everything t
pieces. He horrified a rich playmate by resolvin
his new watch into its component parts — an
promptly quieted him by putting it together again
"Every clock in the house shuddered when it sa
me coming," he recently said. He constructed
small working forge in his school-yard, and built
small steam engine that could make ten miles a
hour. He spent his winter evenings reading me
chanical and scientific journals; he cared little fo

general literature, but machinery in any form was almost a pathological obsession. Some boys run away from the farm to join the circus or to go to sea; Henry Ford at the age of sixteen ran away to get a job in a machine shop. Here one anomaly immediately impressed him. No two machines were made exactly alike: each was regarded as a separate job. With his savings from his weekly wage of $2.50, young Ford purchased a three dollar watch, and immediately dissected it. If several thousand of these watches could be made, each one exactly alike, they would cost only thirty-seven cents a piece. "Then," said Ford to himself, "everybody could have one." He had fairly elaborated his plans to start a factory on this basis when his father's illness called him back to the farm.

This was about 1880; Ford's next conspicuous appearance in Detroit was about 1892. This appearance was not only conspicuous: it was exceedingly noisy. Detroit now knew him as the pilot of a queer affair that whirled and lurched through her thoroughfares, making as much disturbance as a freight train. In reading his technical journals Ford had met many descriptions of horseless carriages; the consequence was that he had again broken away from the farm, taken a job

at $45 a month in a Detroit machine shop, and devoted his evenings to the production of a gasoline engine. His young wife was exceedingly concerned about his health; the neighbors' snap judgment was that he was insane. Only two other Americans, Charles B. Duryea and Ellwood Haynes, were attempting to construct an automobile at that time. Long before Ford was ready with his machine, others had begun to appear. Duryea turned out his first one in 1892; and foreign makes began to appear in considerable numbers. But the Detroit mechanic had a more comprehensive inspiration. He was not working to make one of the finely upholstered and beautifully painted vehicles that came from overseas. "Anything that isn't good for everybody is no good at all," he said. Precisely as it was Vail's ambition to make every American a user of the telephone and McCormick's to make every farmer a user of his harvester, so it was Ford's determination that every family should have an automobile. He was apparently the only man in those times who saw that this new machine was not primarily a luxury but a convenience. Yet all manufacturers, here and in Europe, laughed at his idea. Why not give every poor man a Fifth Avenue house? Frenchmen and Englishmen

scouted the idea that any one could make a cheap automobile. Its machinery was particularly refined and called for the highest grade of steel; the clever Americans might use their labor-saving devices on many products, but only skillful hand work could turn out a motor car. European manufacturers regarded each car as a separate problem; they individualized its manufacture almost as scrupulously as a painter paints his portrait or a poet writes his poem. The result was that only a man with several thousand dollars could purchase one. But Henry Ford — and afterward other American makers — had quite a different conception.

Henry Ford's earliest banker was the proprietor of a quick-lunch wagon at which the inventor used to eat his midnight meal after his hard evening's work in the shed. "Coffee Jim," to whom Ford confided his hopes and aspirations on these occasions, was the only man with available cash who had any faith in his ideas. Capital in more substantial form, however, came in about 1902. With money advanced by "Coffee Jim," Ford had built a machine which he entered in the Grosse Point races that year. It was a hideous-looking affair, but it ran like the wind and outdistanced all competitors. From that day Ford's career has been

an uninterrupted triumph. But he rejected the earliest offers of capital because the millionaires would not agree to his terms. They were looking for high prices and quick profits, while Ford's plans were for low prices, large sales, and use of profits to extend the business and reduce the cost of his machine. Henry Ford's greatness as a manufacturer consists in the tenacity with which he has clung to this conception. Contrary to general belief in the automobile industry he maintained that a high sale price was not necessary for large profits; indeed he declared that the lower the price, the larger the net earnings would be. Nor did he believe that low wages meant prosperity. The most efficient labor, no matter what the nominal cost might be, was the most economical. The secret of success was the rapid production of a serviceable article in large quantities. When Ford first talked of turning out 10,000 automobiles a year, his associates asked him where he was going to sell them. Ford's answer was that that was no problem at all; the machines would sell themselves. He called attention to the fact that there were millions of people in this country whose incomes exceeded $1800 a year; all in that class would become prospective purchasers of a low-priced auto

mobile. There were 6,000,000 farmers; what more receptive market could one ask? His only problem was the technical one — how to produce his machine in sufficient quantities.

The bicycle business in this country had passed through a similar experience. When first placed on the market bicycles were expensive; it took $100 or $150 to buy one. In a few years, however, an excellent machine was selling for $25 or $30. What explained this drop in price? The answer is that the manufacturers learned to standardize their product. Bicycle factories became not so much places where the articles were manufactured as assembling rooms for putting them together. The several parts were made in different places, each establishment specializing in a particular part; they were then shipped to centers where they were transformed into completed machines. The result was that the United States, despite the high wages paid here, led the world in bicycle making and flooded all countries with this utilitarian article. Our great locomotive factories had developed on similar lines. Europeans had always marveled that Americans could build these costly articles so cheaply that they could undersell European makers. When they obtained a glimpse of an

American locomotive factory, the reason becam
plain. In Europe each locomotive was a separat
problem; no two, even in the same shop, wer
exactly alike. But here locomotives are bui
in parts, all duplicates of one another; the par
are then sent by machinery to assembling room
and rapidly put together. American harvestin
machines are built in the same way; whenever
farmer loses a part, he can go to the country sto
and buy its duplicate, for the parts of the san
machine do not vary to the thousandth of an inc
The same principle applies to hundreds of oth
articles.

Thus Henry Ford did not invent standardizatio
he merely applied this great American idea to
product to which, because of the delicate lab
required, it seemed at first unadapted. He so
found that it was cheaper to ship the parts of t
cars to a central point than to ship ten complet
cars. There would therefore be large savings
making his parts in particular factories and shi
ping them to assembling establishments. In t
way the completed cars would always be near th
markets. Large production would mean that
could purchase his raw materials at very low pric
high wages meant that he could get the efficie

labor which was demanded by his rapid fire method of campaign. It was necessary to plan the making of every part to the minutest detail, to have each part machined to its exact size, and to have every screw, bolt, and bar precisely interchangeable. About the year 1907 the Ford factory was systematized on this basis. In that twelvemonth it produced 10,000 machines, each one the absolute counterpart of the other 9999. American manufacturers until then had been content with a few hundred a year! From that date the Ford production has rapidly increased; until, in 1916, there were nearly 4,000,000 automobiles in the United States — more than in all the rest of the world put together — of which one-sixth were the output of the Ford factories. Many other American manufacturers followed the Ford plan, with the result that American automobiles are duplicating the story of American bicycles; because of their cheapness and serviceability, they are rapidly dominating the markets of the world. In the Great War American machines have surpassed all in the work done under particularly exacting circumstances.

A glimpse of a Ford assembling room — and we can see the same process in other American factories — makes clear the reasons for this success.

In these rooms no fitting is done; the fragments o automobiles come in automatically and are simply bolted together. First of all the units are assem bled in their several departments. The rear axles the front axles, the frames, the radiators, and th motors are all put together with the same precisio and exactness that marks the operation of the com pleted car. Thus the wheels come from one par of the factory and are rolled on an inclined plan to a particular spot. The tires are propelled b some mysterious force to the same spot; as the tw elements coincide, workmen quickly put them t gether. In a long room the bodies are slowly a vanced on moving platforms at the rate of abou a foot per minute. At the side stand groups men, each prepared to do his bit, their materia being delivered at convenient points by chute As the tops pass by these men quickly bolt the into place, and the completed body is sent to place where it awaits the chassis. This importa section, comprising all the machinery, starts at o end of a moving platform as a front and rear ax bolted together with the frame. As this slow advances, it passes under a bridge containing gasoline tank, which is quickly adjusted. Fa ther on the motor is swung over by a small hoi

nd lowered into position on the frame. Presently the dash slides down and is placed in position behind the motor. As the rapidly accumulating mechanism passes on, different workmen adjust the mufflers, exhaust pipes, the radiator, and the wheels which, as already indicated, arrive on the scene completely tired. Then a workman seats himself on the gasoline tank, which contains a small quantity of its indispensable fuel, starts the engine, and the thing moves out the door under its own power. It stops for a moment outside; the completed body drops down from the second floor, and a few bolts quickly put it securely in place. The workman drives the now finished Ford to a loading platform, it is stored away in a box car, and is started on its way to market. At the present time about 2000 cars are daily turned out in this fashion. The nation demands them at a more rapid rate than they can be made.

Herein we have what is probably America's greatest manufacturing exploit. And this democratization of the automobile comprises more than the acme of efficiency in the manufacturing art. The career of Henry Ford has a symbolic significance as well. It may be taken as signalizing the new ideals that have gained the upper hand in

American industry. We began this review
American business with Cornelius Vanderbilt
the typical figure. It is a happy augury that
closes with Henry Ford in the foreground. Vand
bilt, valuable as were many of his achievemen
represented that spirit of egotism that was ra
pant for the larger part of the fifty years followi
the war. He was always seeking his own adva
tage, and he never regarded the public interest
anything worth a moment's consideration. W
Ford, however, the spirit of service has been t
predominating motive. His earnings have be
immeasurably greater than Vanderbilt's; his
come for two years amounts to nearly Vanderbil
total fortune at his death; but the piling up
riches has been by no means his exclusive purpo
He has recognized that his workmen are his pa
ners and has liberally shared with them his incre
ing profits. His money is not the product of spe
lation; Ford is a stranger to Wall Street and h
built his business independently of the great ban
ing interest. He has enjoyed no monopoly,
have the Rockefellers; there are more than th
hundred makers of automobiles in the Unit
States alone. He has spurned all solicitations
join combinations. Far from asking tariff fav

he has entered European markets and undersold English, French, and German makers on their own ground. Instead of taking advantage of a great public demand to increase his prices, Ford has continuously lowered them. Though his idealism may have led him into an occasional personal absurdity, as a business man he may be taken as the full flower of American manufacturing genius. Possibly America, as a consequence of universal war, is advancing to a higher state of industrial organization; but an economic system is not entirely evil that produces such an industry as that which has made the automobile the servant of millions of Americans.

BIBLIOGRAPHICAL NOTE

The materials are abundant for the history of American industry in the last fifty years. They exist largely in the form of official documents. Any one ambitious of studying this subject in great detail should consult, first of all, the catalogs issued by that very valuable institution, the Government Printing Office. The Bureau of Corporations has published elaborate reports on such industries as petroleum (Standard Oil Company), beef, tobacco, steel, and harvesting machinery, which are indispensable in studying these great basic enterprises. The American habit of legislative investigation and trust-fighting in the courts, whatever its public value may have been, has at least had the result of piling up mountains of material for the historian of American industry. For one single corporation, the Standard Oil Company, a great library of such literature exists. The nearly twenty volumes of testimony, exhibits, and briefs assembled in the course of the Federal suit which led to its dissolution is the ultimate source of material on America's greatest trust. As most of our other great corporations — the Steel Trust, the Harvester Company, the Tobacco Company, and the like — have passed through similar ordeals, all the information the student could ask concerning them exists in the same form. The archives of such bodies as the Interstate Commerce

Commission and Public Utility Commissions of the State are also bulging with documentary evidence. Thus a the material contained in this volume — and much mor — concerning the New York traction situation will b found in the investigation conducted in 1907 by the Pub lic Service Commission of New York, Second District

American business has also developed a great talen for publicity. Nearly all our big corporations hav assembled much material about their own history, a of which is public property. Thus the American Tele phone and Telegraph Company can furnish detaile information on every phase of its business and history Indeed, one's respect for the achievements of America industry is increased by the praiseworthy curiosity whic it displays about its own past and the readiness wit which it makes such material accessible to the public Despite the abundance of data, there is not a grea amount of popular writing on these subjects that ha much fascination as literature or much value as history The only book that is really important is Miss Id M. Tarbell's *History of the Standard Oil Company*, vols. (new edition 1911). Of other popular volumes th present writer has found most useful Herbert N. Ca son's *Romance of Steel* (1907), *History of the Telephon* (1910), and *Cyrus Hall McCormick: His Life and Wor* (1909); J. H. Bridge's *Inside History of the Carneg Steel Company* (1903); *Henry Ford's Own Story* as to to Rose Wildes Lane (1917).

For Chapter V, the author has drawn from article contributed by him in 1907–8 to *McClure's Magazin* on *Great American Fortunes and their Making;* and fo Chapter IV, from an article contributed to the sam magazine in 1914, on *Telephones for the Millions.*

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